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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII CLEVELAND, OHIO, NOVEMBER 24, 1904 NUMBER 47

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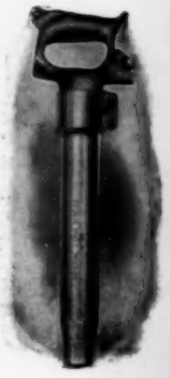


THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, NOVEMBER 24, 1904 NUMBER 47

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The pig iron market has quieted down after the recent heavy buying, but inquiry has been sufficient to bring about further advances by Northern sellers. The feature of anticipation is still the chief characteristic of buying, both in pig iron and finished material, and this introduces an element that is very difficult to gauge. Specifications in finished lines are so much smaller in volume than new orders, that the enthusiasm apparent in some quarters is tempered by matter-of-fact considerations entering into calculations as to the tonnages that will be taken out under these contracts as the months go by. Sellers are attempting to hold buyers down to such tonnages as will approximate probable requirements and the necessity for suppressing the speculative factor in all movements like the present one is fully recognized. Advances in practically all the lighter forms of finished iron and steel followed the heavy buying reported last week, and there are indications that on some products prices may go somewhat higher in the near future.

The Southern pig iron situation is practically unchanged. At $13 to $13.50 for No. 2 iron at Birmingham there is a general disposition of foundrymen to wait for better light on the situation. Buying has subsided markedly with the advance in price and foundrymen, while noting an improvement in orders in the past month, are disposed to see that this is more pronounced before contracting for any great amount of iron at $4 to $4.50 above the price of a few months ago. There are exceptions to the rule, however, and several inquiries from the larger consumers are now up. Resale iron has been offered in the week at $13 Birmingham. Northern furnaces have had inquiry enough this week to lead them to narrow the margin between the quotations of the two sections, and the range of $14.50 and $15 at Central Western furnaces has been succeeded by $15 and $15.50. Bessemer pig, with practically no immediate demand, is quoted at $14.75 at Valley furnace. A further increase in active capacity of Steel Corporation furnaces is being made this week.

The railroads have contributed largely to the activity in finished lines in the past week. Work taken by the American Bridge Co. in that time includes 30,000 tons for railroad bridges, and a 12,000-ton contract with the Boston Elevated is pending. The rail situation is still unsettled, but it is expected that the basis for standard sections will be fixed within the next fortnight and that matters pending with the one producer not now fully allied with the pool will be arranged. Light rails have advanced $1 a ton on good buying and the large business in spikes has brought a similar advance. Relaying rails have sold at $16 Pittsburg.

The heavy buying in billets and steel bars just preceding the New York meetings of last week has been followed by a week of lessened tonnage. But bar iron is higher, 1.45c at Mahoning Valley mill being minimum, while $1 a ton more has been paid in some cases. The Eastern bar iron manufacturers have advanced to 1.40c base Pittsburg. The difference between steel and iron is now enough to cause some buyers to turn to steel, and as bar iron under present prices for scrap promises at least to maintain its price, the position of steel is very strong, though one large interest prevented an advance at the New York meeting.

Sheet and tin plate demand have improved greatly in the past two weeks, particularly the latter, large contracts having been taken by the leading producer, followed by the starting of idle mills, the expectation being that this week will see practically the full operation of its capacity. The advance in sheets last week amounts to $1 for blue annealed and $2 for box annealed black sheets and $3 for galvanized, and the condition of the trade is most healthy. The $2 advance in wire products was followed by a similar advance in cut nails. Wire deliveries are now restricted to but a few weeks ahead of purchase and further advances are anticipated.

The plate situation is kept as good as it is chiefly by car and vessel building, but the boiler and tank trades have not yet shown great life. The structural outlook has certainly improved, but here, as in plates, the season was not considered one in which advances were to be thought of. However, long drawn contracts in plates and shapes are avoided, and July 1, 1905, is the usual limit.

In all finished lines the business booked betokens a general expectation of unusual activity in the coming year. Reports concerning contracts taken by the Steel Corporation indicated the largest two weeks' business in more than a year.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Nov. 23.

Advances ranging from $2 to $3 a ton have been made in some finished lines, and that further advances are anticipated by the manufacturers is indicated by the refusal of a large number of mills to take business at prevailing quotations for extended future deliveries. The advances have been conservative as compared with the upward movement of pig iron, and in case of still higher prices for the latter there would be another readjustment of the finished market on a higher basis. Following the meeting of the billet manufacturers at which a uniform advance of $1.50 a ton was made, meetings of the plate and structural associations were held. Quotations were reaffirmed as it was deemed unwise to make advances in these lines at this season of the year, despite the bright outlook for the future, especially in plates. An informal conference of the steel bar manufacturers was also held, and another meeting will be held shortly at which a slight advance will be made. The leading producers of bar iron have made another advance of $2 a ton, the differential between the steel and iron product now ranging from $4 to $5 a ton. A uniform avance of $2 on all wire products went into effect on the 16th and the cut nail manufacturers made a like ad-

vance. Black sheets have been put up $2 and galvanized $3, while corrugated roofing has been proportionately advanced. On the 15th the American Sheet & Tin Plate Co. announced an advance of 15 cents a box on coke plates. Uniformly higher prices corresponding with those announced have been made in nearly all finished products manufactured from the materials advanced.

The buying of finished products has been unusually heavy. Consumers of sheets, tin plate and wire products bought as heavily for future requirements as the mills permitted prior to the announcement of these advances, and this week they are endeavoring to cover requirements through the first half of next year. On sheets and tin plate it is difficult to cover beyond the first quarter, and on wire products little can be closed for delivery after the first of the year. Anticipating an early advance on steel bars the buying has been heavy for deliveries running through the first half of next year, and while much of this tonnage is warranted by increased consumption, much is speculative and the mills are paring requirements wherever there are indications of the consumer merely buying in a precautionary way. On sheet bars and billets few of the mills will take business at present prices running far into next year and slight premiums have already been offered by sheet mills for sheet bars for delivery through the first half. The sheet situation is unsually strong and a number of the independent mills will not sell for delivery through the first quarter at the advanced prices now asked. The advance in tin plate was warranted by the heavy buying during the past few weeks. Excepting the mills that are having financial difficulties, practically all of the independent mills are in operation, while the American Sheet & Tin Plate Co. has started or is preparing to start 75 idle tin mills. During the past few months less than one-half of its tin plate producing capacity has been in operation.

No meeting of the rail pool was held last week, although a meeting will be held next week or the week following to establish prices for next year. At present a committee is endeavoring to work out a plan that will be satisfactory to the Lackawanna Steel Co. so that the latter can become a full fledged member of the pool. At present this company is quoting pool prices and has announced that it will continue to quote on the basis established by the pool.

The old material market has been unusually active, the Pennsylvania Railroad having disposed of 18,000 tons of rerolling rails at $15, dealers and mills being the buyers. This company placed this price on this material six months ago and refused to sell at the lower figures offered during the summer months. It is claimed that one of the leading steel interests from which this road purchased standard sections earlier in the year guaranteed to take these rails at $15 provided that price could not be secured from outside consumers. In this way the railroad company was partly satisfied on the price of $28 for rails and in addition the raw material was held up on the rerolling mills. This salvage to the railroads has always amounted to considerable in the past, and there have been periods when the railroads have secured more for their discarded rails than they were compelled to pay for the new material. One eastern steel mill disposed of 20,000 tons of heavy melting stock on the basis of $13 and $14 at the mill, equivalent to $14 and $15, Pittsburg. The bulk of this material went to dealers, although a portion was traded for pig iron.

Pig Iron.—Some further advance has been made on nearly all grades of iron, although the buying has been limited. Little iron is available for delivery the remainder of this year and most of the furnaces have a comfortable tonnage on their books for delivery the first quarter. Little Bessemer iron was sold in the week but the minimum price at which it can now be had is $14.75 at the furnace for any delivery and as high as $15.25 is asked. No. 2 foundry iron has sold as high as $16 in the Valleys and the lowest Pittsburg asking price is $16.35. Forge iron is strong and scarce at $14.35 to $14.50 at the furnace, while basic is held at $14.25 to $14.50. Much is being made of a possible scarcity of ore at merchant furnaces, but as yet the situation is not sufficiently clear as to a possible shortage and in the minds of many it is believed that the situation has been exaggerated. Coke shipments continue bad and operations in the coke region continue to be hampered by the shortage of water. A number of coke works have been compelled to curtail production during the week, but it is not believed the output would be much reduced even if there should be no replenishment of the water supply in the next two weeks.

The Westinghouse Electric Co. is in the market this week for 8,000 tons of foundry and forge iron for delivery through the first quarter and the prices that are paid will more clearly outline the present condition of the furnace order books for that period. This week the Carnegie Steel Co. will blow in a third stack at South Sharon. This is known as furnace No. 3 and was only recently completed. Its operation will give a surplus of iron at this plant which will be utilized at New Castle where the requirements of the steel works are increasing owing to the resumption of the tin plate mills. Southern furnaces are asking $13 to $13.50 Birmingham for No. 2 for any delivery and little iron is being sold in this market as the delivered price on the higher basis would be $17.85 Pittsburg. We revise quotations as follows:

Bessemer, Valley	$14 75 to 15 00
Bessemer, Pittsburg	15 60 to 15 85
No. 1 Foundry	16 75 to 17 00
No. 2 Foundry	16 35 to 16 85
Gray Forge, Pittsburg	15 10 to 15 35
Basic, Valley	14 25 to 14 50
Basic, Pittsburg	15 10 to 15 35

Steel.—The advance in the price of billets and bars has brought out some belated buying for future requirements, but the mills are not anxious to sell too far ahead at these prices and several producers are asking premiums on sheet bars through the first half. We make the following quotations: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $21, f. o. b. mill, Pittsburg; with actual freight to point of delivery; 0.26 and including 0.60 carbon, $1 advance; 0.61 to 1.00 carbon $2 advance. Billets smaller than 4 x 4 inches, $2 advance; sheet and tin bars, $23; cut bars $23.50; forging billets, $23. Bessemer and open-hearth steel rods are held at $27 to $28.

Ferro-Maganese.—The market is firmer than it has been for some time but low prices continue to be made on account of the foreign competition. We quote domestic ferro at $41 to $42 for 80 percent, delivered at buyer's mill, any point east of the Mississippi.

Muck Bar.—There is little demand and the nominal quotation is $26 to $26.35, Pittsburg.

Skelp.—Pipe mills are covering for future requirements and prices are higher. Grooved steel is held at 1.35c to 1.40c, and sheared at 1.45c to 1.50c. Grooved iron is strong at 1.55c to 1.60c and sheared at 1.60c to 1.65c.

Rails and Track Material.—Rail prices for next year will probably be fixed within the next two weeks. A committee is now at work attempting to adjust the difficulty with the Lackawanna Steel Co. and if matters can be satisfactorily settled this concern will become a member of the pool. On the other hand assurance has been given that pool prices will be maintained whether satisfactory tonnage adjustment is made or not. Demand for spikes is improving and a slight advance has been made. We quote standard sections, 50 lb. and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 12 lb., $23; 16 to 25 lb., $22; 25 to 45 lb. $20.50. Spikes, 1.60c to 1.65c.

Plates.—This week several of the mills of the Homestead works of the Carnegie Steel Co. were shut down for repairs. Otherwise the plate mills in this district are on in full on car and ship plates. Outside of these lines there is little demand and the producers do not see much encouragement from the boiler and tank trade in the immediate future. At the meeting of the plate association held last week in New York prevailing quotations were reaffirmed as follows: Tank plates, ¼ in. thick, 6¼ to 24 in., inclusive, 1.30c f. o. b. mill, Pittsburg; over 24 in. up to 100 in., 1.40c. Extras are as follows per pound: Flange and boiler steel, 10c; marine,A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive fire box. 50c; plates over 100 in. up to 110 in. in width, not less than 5c per 100 lbs. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $2 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Structural Material.—At the meeting of the structural pool held last week in New York quotations were reaffirmed as conditions did not warrant a change and it was considered that an advance at present would be unseasonable. Quotations are as follows: Beams and channels up to 15 in., 1.40c; over 15 in., 1.50c; angles, 3 x 2 up to 6 x 6, 1.40c; zees, 1.40c; tees, 1.45c; angles, from 3 to 16 in., 1.40c; universal and sheared plates, 6¼ to 24 in., inclusive, 1.30c; over 24 in., 1.40c base.

Bars.—The buying of steel bars, due to an anticipated advance, has been exceedingly heavy and some of the manufacturers are inclined to cut down requirements as they believe that considerable buying is speculative. An informal meeting of the steel bar manufacturers was held in New York last week and another meeting will be held shortly when it is believed that an advance of $1 or $2 a ton will be made. Another advance in iron bars amounting to $2 has been made, the leading producers now quoting 1.54¾c, Pittsburg. One of the leading manufacturers will only take business for immediate shipment and will not close at present prices for future delivery. We revise quotations as follows: Bar iron, 1.50c to 1.54¾c Pittsburg; hoops, 1.55c, and bands, 1.30c, both taking bar extras. Bessemer steel bars, 1.30c; open-hearth steel bars, 1.35c; plow and cultivator beams, 1.30c, net; channels, angles, zees and tees, under 3 in., 1.40c. The following differentials are maintained on steel: Less than 2,000 lb. of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Pipes and Tubes.—The buying of boiler tubes continues heavy, one contract for 10,000 tons having been placed. Another advance in merchant pipe is anticipated by the trade by the first of the month. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as folows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	69	52	67	51
⅜ to 6 inches	77	67	75½	65½
⅛ and ½ inch	73	61	71	59
7 to 12 inches	72	57	70½	55
Extra Strong Plain Ends.				
⅛ to ⅜ inch	62	50	60	48
½ to 4 inches	69	57	67	55
4½ to 8 inches	65	53	63	51
Double extra strong plain ends, ⅛ to 8 inches	58	47	56	45

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inches	46	43
1¾ to 2¼ inches	58	43
2½ inches	60	48
2¾ to 5 inches	66	55
6 to 13 inches	58	43

Merchant Steel.—Slight advances have been made all along the line, although shafting remains unchanged. We revise quotations as follows: Toe calk, 2c; carriage spring steel, 1.85c; tire steel, 1.60c to 1.65c; plow steel, 6 in. and under, 1.35c for Bessemer and open-hearth; plow slabs, ½ in. and heavier, 1.60c. Draw and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Sheets.—Black sheets have been advanced $2 and galvanized $3 and few of the mills are anxious to take business for forward delivery at these prices. Corrugated roofing has been advanced 10 cents, painted to $1.70 and galvanized to $2.90. Eaves trough and conductor pipe have been advanced 7½ percent. The sheet situation is strong and for delivery through the first quarter some of the independent mills are asking an advance of $2 above present prices. We revise quotations as follows: Black sheets, carload lots, one pass, No. 8, 1.70c; No. 9, 1.75c; Nos. 12 to 14, 1.80c; Nos. 15 to 17, 1.90c; Nos. 18 to 21, 1.95c; Nos. 22 to 24, 2c; Nos. 25 to 26, 2.05c; No. 27, 2.10c; No. 28, 2.20c; No. 29, 2.50c; No. 30, 2.60c. Galvanized: Nos. 16 to 17, 2.50c; Nos. 18 to 21, 2.55c; Nos. 22 to 24, 3c; Nos. 25 to 26, 3.05c; No. 27, 3.10c; No. 28, 3.25c; No. 29, 3.60c; No. 30, 4c.

Tin Plate.—On Nov. 15, tin plate prices were advanced by the American Sheet & Tin Plate Co. 15 cents a box. This was immediately followed by a like advance on the part of the independent manufacturers. Demand for tin plate has been heavy and as a result of the urgent demand for early deliveries at least 75 of the idle mills of this company will resume operations. The Star works in this city containing 8 mills resumed this week, while 20 of the 30 mills of the Shenango plant at New Castle and 10 of the 20 mills at Sharon will resume shortly. Sixteen of the mills in the Martins Ferry plant also resumed and 20 of the mills in the American works in Indiana will resume shortly. The present advance is simply restoring the prices that prevailed prior to July 25 when a reduction of $3 a ton was made. We quote 100-pound coke plates at $3.45 per box, f. o. b. mill, Pittsburg.

Wire and Wire Nails.—A uniform advance of $2 a ton was made last week on all wire products and the cut nail manufacturers, folowing the advance on wire nails have marked up quotations $2 a ton. The buying of wire products since the advance has not been heavy, as all the large jobbers have covered at lower prices. We revise quotations as follows: Wire nails, jobbers' carload lots, $1.70; retailers' carloads, $1.75, and less than carloads, $1.85; painted barb wire, $1.85 to jobbers in carloads; retailers' carloads, 1.90, and less than carloads, $2, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.55, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron and cut nails are held at $1.75 and steel 1.70.

Old Material.—There have been heavy transactions in old material during the week, the Pennsylvania Railroad disposing of 18,000 tons of rerolling rails at $15, gross ton. Throughout the summer this company has refused to sell below this figure and it is asserted that this price was guaranteed by one of the leading steel interests if it could not be secured from outside consumers. We also note the sale of 20,000 tons of heavy melting stock by an eastern steel mill at prices ranging from $14 to $15, Pittsburg. The bulk of this material was taken by dealers, although a portion of this material will be exchanged for pig iron. The scrap market continues strong and dealers are expecting a still higher market owing to the advances in pig iron. We revise quotations, gross tons, as follows: Heavy melting stock, $14.75 to $15; cast scrap, $13.50 to $13.75; No. 1 wrought scrap, $14.50 to $14.75; iron borings,

$8.50 to $9; re-rolling rails, $15 to $15.25; sheet scrap, bundled, $12.25 to $12.50.

Coke.—While water continues very short in the Connellsville region it has not curtailed production any appreciable extent. A few operators have been compelled to go out during the week while others have only been able to operate five days, but the threatened famine promised will hardly materialize as the almost unlimited supply of mine water is making up for the deficiency in other directions. Foundry coke for prompt shipment is held at $2.50, while for future delivery as low as $2.25 is quoted although $2.50 has been paid. Furnace coke for early delivery is held at $2.10 to $2.25 while for the first half of next year $2 is asked. In the upper and lower regions about 8,000 ovens are idle, the production of the upper region during the week ending Nov. 12 amounting to 195,851 tons, while the lower region produced 64,344 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Nov. 22.

The Illinois Steel Co. has had plans made for an addition to its South Chicago plant of 28-in. structural mill, to cost in the neighborhood of $1,200,000. No contracts have been let as yet, although it is stated that construction work will be commenced in the immediate future. The mill, which will be located west of the new blooming mill, will roll beams up to 15 in., and will have a capacity ranging from 12,000 to 15,000 tons a month. This addition is in line with the improvements that were decided upon for this plant over a year ago. Seven additional 50-ton open-hearth furnaces have been put in, bringing the total up to 17 in. at the South Chicago works, and the blooming mill, which has been under construction for several months, is rapidly nearing completion.

Trade conditions in iron and steel are about as satisfactory as can be desired. There is not the feverish activity that was evident earlier in the month, but what is more desired by the seller, there is a steady demand for all products. The danger of the slump in prices which it was thought would follow the first weakening in demand after the rocket-like advances in the staple materials, seems to have passed, and the indications point to continued and increasing activity for several months. Contrary to expectations, none of the products controlled by pool agreements, with the exception of billets, was advanced at the meetings held last week, the prices of steel bars, plates and structural steel being reaffirmed. Billets were put up $1.50 a ton, making the Chicago price for forging steel $26, and for rerolling $24. No action was taken by the rail association towards establishing the price of standard sections for the coming year, and until another meeting, which it is expected will be held soon, the old quotations remain in force. There were advances in other finished materials, however. Wire products were put up $2 a ton; black and galvanized sheets, $2 a ton, and steel boiler tubes, $4 a ton. These advances had been expected for some weeks, and to a considerable extent consumers had anticipated them by placing large orders. No diminution is to be noted in the demand, and it is becoming extremely difficult to get prompt deliveries of the above materials, manufacturers of black sheets in particular asking premiums of $1 a ton and more over the new prices, for early shipments. In pig iron and coke, the advancing prices seem to have acted as a check on demand. Only a few Southern furnaces are in the market with iron for delivery in the first quarter, and these are asking on the basis of $13.50 for No. 2 foundry, Birmingham, or $17.15 Chicago. Northern producers have not changed their quotations of last week, and $16 Chicago for No. 2 is still in effect. Coke is scarce and firm at $4.90 to $5.15 Chicago for Connellsville, and $4.75 Chicago for Wise County fuel. Scrap continues its upward movement, being substantially 50 cents a ton higher than a week ago.

Local jobbers of finished material are very firm in their views and an advance of $2 to $3 a ton will be made later this week on all materials shipped from warehouse stocks, including plates, steel bars, structural steel and other products.

Pig Iron.—With the exception of a few leading interests, all the furnaces below the Ohio river have withdrawn from the market. Those that have iron for sale have advanced their quotations to $13.50 Birmingham for No. 2 foundry, or $17.15 Chicago. No iron is being offered in this market at less than this price, those furnaces with any to sell holding firmly. Some difference of opinion exists among sellers as to the advisability of pushing prices up so rapidly, and the impression prevails that for awhile foundrymen will withhold their orders until the market becomes settled. Whether it is a result of the last raise or due to the fact that Western melters are pretty well covered for the next few months, it is certainly true that the activity in pig iron is not near so marked as earlier in the month. A good tonnage has been booked in the past week, but it does not compare with the figures of previous weeks. The bulk of the business placed since our last report has gone to Northern furnaces, which are still holding their product at $16 Chicago for No. 2 foundry. It is not likely that Southern producers will be able to maintain for long the excess of $1.15 a ton over the product of Northern furnaces, and some weakening is looked for as soon as the coke shortage in the South is rectified We have revised our prices and quote as follows:

Lake Superior Charcoal	$ 17 00
Northern Foundry No. 1	16 50 to 17 00
Northern Foundry No. 2	16 00 to 16 50
Northern Foundry No. 3	15 50 to 16 00
Northern Scotch Foundry	17 00
Ohio Strong Softeners No. 1	17 80 to 18 30
Ohio Strong Softeners No. 2	17 30 to 17 80
Southern Foundry No. 1	17 65
Southern Foundry No. 2	17 15
Southern Foundry No. 3	16 65
Southern Foundry No. 4	16 15
Southern No. 1 Soft	17 65
Southern No. 2 Soft	17 15
Southern Gray Forge	15 90
Southern Mottled	15 90
Southern Silveries (4% to 6% Silicon)	17 90 to 18 40
Jackson Co. Silveries (6% to 8%)	20 20 to 20 70
Jackson Co. Silveries (8% to 10% Silicon)	20 70 to 21 20
Alabama and Georgia Car Wheel	19 65
Malleable Bessemer	16 50 to 17 00
Basic Iron	17 15

Billets.—The expected advance in billets was announced last week after the meeting of the association, and both forging and rerolling were raised $1.50 a ton. There has been a brisk demand all week, and some interests who are well sold up, asking premiums for quick shipments. We have revised our prices, and quote on carload lots, Chicago delivery, as follows: Forging billets, 4 x 4 and larger, up to but not including 10 x 10, $26. Rerolling billets, Bessemer or open-hearth, 4 x 4 and larger up to .25 carbon, $24; up to and including .60 carbon, $1 extra. Billets, 3⅞ inches and smaller, and sheet and tin bars, $26. Wire rods which nominally are quoted $30 Pittsburg, may be shaded about $1 a ton on desirable specifications.

Bars.—The demand for steel bars continues at high pressure, the fact that no change in prices was made at the recent meeting of the association having greatly stimulated buying. Specifications and new business are coming in from all classes of consumers in greatly increased volume, buyers wherever possible covering for their requirements up to July 1. The demand for bar iron has subsided somewhat, though mills are experiencing no trouble getting 1.50c Chicago. We quote prices for Chicago delivery, mill shipments, which are without change, as follows: Bar iron, 1.50c to 1.55c; soft steel bars, 1.46½c to 1.56½c; soft steel angles, less than 3 x 3, 1.56½c; hoops,

1.71½c, full extras. Local jobbers quote iron, 1.70c to 1.75c base, full extras; hoops, 2c to 2.10c rates, full extras.

Sheets.—There has been an exceptionally strong demand for both black and galvanized sheets in this market, and the new prices which went into effect last week have been more than sustained. This advance amounts to $1 a ton on blue annealed sheets, $2 a ton on box annealed sheets, and $3 a ton on the galvanized product. In some instances, premiums of $1 a ton above the new prices are being asked by mills and jobbers on orders for quick delivery. We have revised our prices, and quote mill shipments, carload lots, Chicago delivery, as follows: Nos. 9 and 10, 1.76½c to 1.81½c; Nos. 11 and 12, 1.81½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; Nos. 15 and 16, 1.96½c to 2.01½c. On box annealed, one pass, cold rolled: Nos. 18 and 20, 2.11½c to 2.16½c; Nos. 22 and 24, 2.16½c to 2.21½c; Nos. 25 and 26, 2.21½c to 2.26½c; No. 27, 2.26½c to 2.31½c; No. 28, 2.31½c to 2.36½c; No. 29, 2.51½c to 2.56½c; No. 30, 2.61½c to 2.66½c. Jobbers prices are very firm, and further advances in the near future are expected. We quote lots from stock as follows: No. 10, 1.95c to 2c; No. 12, 2c to 2.05c; No. 14, 2.05c to 2.10c; No. 16, 2.15c to 2.20c; No. 18, 2.30c to 2.35c; No. 20, 2.35c to 2.40c; No. 22, 2.40c to 2.45c; No. 24, 2.45c to 2.50c; No. 26, 2.50c to 2.55c; No. 27, 2.60c to 2.65c; No. 28, 2.70c to 2.75c; No. 29, 2.80c to 2.85c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: No. 12-14, 2.36½c; No. 16, 2.51½c; No. 18-21, 2.66½c· No. 22-24, 2.81½c; No. 26 3.01½c; No. 27, 3.21½c; No. 28, 3.41½c. Jobbers' prices on galvanized sheets from store are as follows: Nos. 10 to 16 inclusive, 2.70c to 2.80c; Nos. 18 and 20, 2.80c to 2.90c; Nos. 22 and 24, 3c to 3.10c; No. 26, 3.20c to 3.30c; No. 27, 3.40c to 3.50c; No. 28, 3.60c to 3.70c; No. 29, 4.05c to 4.15c; No. 30, 4.50c to 4.60c.

Structural Steel.—A good sized tonnage has been placed with mills in the past week, though most of it was in the form of contracts for future deliveries. Specifications are on the increase, and the entire output of mills goes into immediate consumption.. Prices are without change, and we quote mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.56½c; angles, 3 to 6 in., ¼-in. and heav-Prices are without change, and we quote mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.56½c; angles, 3 to 6 in., ¼-in. and heavier, 1.56½c; angles, larger than 6 in. on one or both legs, 1.66½c; beams, larger than 15 in., 1.66½c; zees, 3-in. and over, 1.56½c; tees, 3-in. and over, 1.61½c, with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. Store prices on structural materials are 1.80c to 1.90c for angles, beams, channels, base sizes, with 1.90c to 2c for 18, 20 and 24-in. beams; tees and zees, 1.85c to 1.95c. These prices are for either random lengths or cut to lengths.

Plates.—No diminution is to be noted in the heavy demand that has been felt for the past three weeks for this product, and the local mill has enough tonnage on its books to keep it in continuous operation for the next three months. Prices are without change as follows: Tank steel, ¼-in. and heavier, 24-in. wide and under, rectangular plates only, 1.46½c base; over 24-in. to 100-in. wide, 1.56½c base; flange steel, 1.66½c base; marine steel, 1.76½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, 5c extra. Prices from store are as follows: Tank steel, ¼ in. and heavier, 1.80c to 1.90c; 3-16, 1.90c to 2c; No. 8, 1.90c to 2c; flange steel, 2.05c to 2.15c.

Rails and Track Supplies.—Sales of light rails and track supplies continue of a very active nature, in the aggregate amounting to a large tonnage, and prices of both products are much firmer. The expected action in the change of prices on heavy rails was not taken at the pool meeting held last week, but an announcement is looked for early this week. We continue to quote the old prices, as follows: Heavy sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $21 to $23· track supplies, f. o. b. Joliet mill, angle bars, 1.30c; spikes, first quality, 1.60c to 1.65c; track bolts, 3¾ x ¾, with square nuts, 2.25c to 2.30c per 100 lbs.; with hexagon nuts, 2.40c to 2.45c.

Merchant Steel.—The demand for the products quoted below and kindred materials, is limited by the output of mills. On favorable specifications for early shipments producers are in position to do well by the buyer, but for deliveries in the new year, mills are refraining from increasing the tonnages on their books. No changes in prices have been made, and we quote mill shipments, Chicago delivery, as follows:

Spring steel, 1.85c; sleigh shoe, flat sizes, 1.51½c; concave and convex, 1.60½c to 1.71½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.71½c; smooth finished tire, 1.66½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.01½c; crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up; cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Merchant Pipe.—Pipe mills report a continuance of the good business of the past few weeks, both in the way of new orders, supplementary tonnages and increased specifications. We quote prices on carload lots, mill shipments, random lengths, f. o. b. Chicago, which are without change as follows:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
¼ and ⅜ inches	67.35	51.35	65.35	49.35
½ and ⅝ inches	71.35	59.35	69.35	57.35
¾ to 6 inches	75.35	65.35	73.85	63.85
7 to 12 inches	70.35	55.35	68.85	53.35

Boiler Tubes.—An advance of $4 a ton has been made in steel boiler tubes, the same going into effect Nov. 12 last. The demand for both iron and steel tubes is improving, and producers look for a continued good tonnage. We have revised our prices, and quote mill shipments, Chicago delivery, as follows:

BOILER TUBES.

	L. W. Steel Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	44.35	41.35	52.35
1¾ to 2¼ inch	56.35	41.35	40.35
2½ inch	58.35	46.35	43.35
2¾ inch to 5 inch	64.35	53.35	Up to 4 inches.
6 to 13 inch	56.35	41.35	50.85

The following are the agreed discounts from store:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40½	37½	40
1¾ to 2¼ inches, inclusive	50½	35	37½
2½ inches, inclusive	53	37½	40
2¾ to 5 inches, inclusive	60½	47½	47½
6 inches and larger	50½	35	

Cast Iron Pipe.—There is a good inquiry from gas companies and a considerable tonnage from this source is pending. Municipal work is quiet and business from this source is almost nil. Prices are without change, and we quote carload lots, Chicago delivery, as follows: Four-in. water pipe, $26.50; 6-in. and larger, $25.50; gas pipe, $1 a ton higher.

Wire Products.—The leading interest announced an advance in wire nails, fencing, smooth wire, staples, etc., effective Nov. 16, amounting to $2 a ton. We have revised our prices, and quote carload lots to jobbers, Chicago delivery, mill shipments, as follows: Wire nails, 1.85c; painted barb wire, 2c; galvanized barb wire, 2.30c; smooth annealed wire, 1.70c; smooth galvanized wire, 2c; polished staples, 1.95c; galvanized staples, 2.25c. Less than carload

lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent to 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 pounds.

Foundry Coke.—The market is very strong and coke difficult to obtain. Standard 72-hour Connellsville is quoted from $4.90 to $5.15 Chicago, and Wise County coke (Va.) $4.75 Chicago.

Old Material.—The demand from consumers of scrap is on the increase and a number of good sized transactions have been closed in the week under review. The market has been further stimulated by the purchases of several large dealers who are sold short and who are seeking to cover for their additional requirements. There is no lack of demand from any source for old material, and by following the policy of declining to sell except at or around the quotations given below, dealers are forcing the market upward. We have advanced a number of materials from 50 cents to $1 a ton. We quote dealers' selling prices, gross tons, as follows:

Old steel rails (4 feet and over)	$14 75 to 15 25
Old steel rails (less than 4 feet)	13 25 to 13 75
Old iron rails	20 00 to 21 00
Relaying rails, subject to inspection	21 50 to 22 50
Relaying rails, subject to inspection	19 00 to 20 00
Old wheels	14 50 to 15 00
Heavy melting steel	13 50 to 14 00
Mixed country steel	9 75 to 10 25
Low phosphorus scrap (.04 and under)	13 50 to 14 00

The following quotations are for net tons:

No. 1 R. R. wrought	15 50 to 16 00
No. 2 R. R. wrought	14 50 to 15 00
Shafting	15 00 to 16 00
Dealers' Forge, No. 1	11 00 to 11 50
Wrought pipe and flues	11 00 to 11 50
No. 1 cast, 150 lb. and less	13 00 to 13 50
No. 1 mill	8 00 to 8 50
Country sheet	5.50 to 6 00
No. 1 boilers, cut	11 00 to 11 50
Boiler punchings	11 00 to 12 00
Iron car axles	19 50 to 20 00
Steel car axles	17 00 to 18 00
Iron axle turnings	9 50 to 10 00
Steel axle turnings	9 00 to 9 50
Cast borings	6 50 to 7 00
Mixed borings, etc.	6 50 to 7 00
Wrought turnings	9 50 to 10 00
Machine shop turnings	9 50 to 10 00
Railroad malleable	12 00 to 12 50
Agricultural malleable	11 50 to 12 00
Stove plate and light cast scrap	10 00 to 11 00
Old iron splice bars	15 50 to 16 00

The furnace of the Spring Valley Iron & Ore Co., Spring Valley, Wis., Frederick H. Foote, proprietor, will be blown in for the first time Dec. 10. The product of this stack will be malleable Bessemer, and Lake Superior coke irons. Matthew Addy & Co., Cincinnati, have been appointed selling agents, and Charles L. Miner, the Chicago representative of this concern, will handle the Spring Valley iron in this territory.

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, NOV. 23.

Opinions differ widely as to whether there will be many merchant furnaces which will not have enough ore to meet their requirements up to the opening of navigation next spring. Officials of leading interests have expressed their conviction that a majority of the stacks outside of the corporation will be short from 20 to 40 percent, but the general opinion in Cleveland is that, while here and there a furnace may be compelled to blow out, the demand for ore has been pretty well taken care of. This view is supported by the fact that during the past week comparatively few inquiries have been received by sellers. Unsold ore is now very scarce and few sales are being made. Prices are about as last week, as follows: Old range non-Bessemer, $3 to $3.25; old range Bessemer, $3.65 to $3.75; Mesabi non-Bessemer, $3 to $3.25; Mesabi Bessemer, $3.15 to $3.50.

Some of the principal shippers outside of the steel corporation have nearly completed their shipments and there is little demand for wild tonnage. Freight rates have advanced to a basis of 80 cents from the head of the lakes.

Pig Iron.—Some sellers report a decrease in inquiries, but a majority say that the demand is as strong as it was last week, and prices are advancing. The usual quotation on No. 2 foundry is $15.50 at the furnace, although sales have been made at $15.35. Some companies are not anxious to sell at $15.50 for delivery after Jan. 1. The Cleveland price for local delivery is $15.50 at the stacks and the furnaces have very little iron for sale for the remainder of this year. Basic and Bessemer are selling at $14.50 to $14.75, Valley. Southern companies are offering very little iron and are asking $13.50, Birmingham, for No. 2, which, being equivalent to $17.35, Cleveland, is almost prohibitive in tnis district. Owing to the poor water supply in the coke regions, the coke is high in sulphur and scarce. Contracts for large amounts of furnace coke have been made at $2.15 and foundry coke is selling at $2.50. We quote as follows for Cleveland delivery:

Bessemer	$15 35 to 15 60
No. 1 Foundry	16 00 to 16 25
No. 2 Foundry	15 50 to 16 35
No. 3 Foundry	14 50 to 15 00
No. 2 Southern	17 35
Gray Forge	15 00 to 15 25
Gray Forge, Southern	15 50 to 15 85
Lake Superior charcoal	15 50 to 16 00

Finished Material.—Demand continues strong and the only feature which causes doubt as to the soundness of the market is the fact that specifications are not coming in on some contracts as freely as might be desired. The specifying is much better than it was a few months ago, but has not increased at the same rate as has the making of contracts. Hence there is a suspicion that some buyers are inclined to speculate and sellers are not urging the making of contracts which may not prove of any value if the present basis of prices is not maintained. The price of bar iron has again been advanced, the present quotation being 1.50c to 1.55c at the mills. Even at these quotations, mills will not sell for delivery after Jan. 1. They are hoping for lower prices of scrap. With iron so high and steel selling at 1.39½c Cleveland for Bessemer and 1.44½c for open hearth, with no immediate prospect of advance, steel will be substituted for iron wherever possible. Prices of sheets have been advanced as follows: Blue annealed, $1 per ton; No. 17 and lighter gauges, $2; galvanized, $3. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in car load lots, No. 10, 1.69½c; No. 11-12, 1.74½c; No. 14, 1.79½c; No. 16, 1.89½c; No. 27, 2.24½c; No. 28, 2.34½c. Galvanized mill sales: No. 14, 2.39½c; No. 16, 2.49½c; No. 18-20, 2.63½c; No. 22-24, 2.79½c; No. 25, 2.99½c; No. 27, 3.19½c; No. 28, 3.39½c. Out of stock, black sheets, ¼ in., 1.70c; 3-16 in., 1.80c. Blue annealed: No. 10, 2c; No. 12, 2.05c; No. 14, 2.10c; No. 16, 2.20c. One pass cold rolled: No. 18-20, 2.35c; No. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c. Galvanized out of stock: No. 16, 2.75c; No. 18-20, 2.85c; No. 22-24, 3c; No. 26, 3.20c; No. 27, 3.40c; No. 28, 3.60c; No. 30, 4.40c.

Old Material.—Prices have again advanced on nearly all kinds of scrap and the demand is strong. Mills have been buying, although insisting that prices are too high. We quote as follows, gross tons, Cleveland:

Old iron rails	$19 00 to 20 00
Old steel rails (over 6 feet)	14 00 to 15 00
Old steel rails (under 6 feet)	14 00 to 15 00
Old car wheels	13 50 to 14 50
Steel boiler plate	10 00 to 11 00
Malleable iron (railroad)	13 00 to 14 00
Malleable iron (agricultural)	11 50 to 12 00
Heavy steel	13 75 to 14 25

We quote as follows, net tons:

No. 1 R. R. wrought	14 00 to 14 50
No. 1 busheling	13 50 to 14 00
No. 1 machine cast	13 00 to 13 50
Iron axles	18 00 to 18 50
Axle turnings	9 50 to 10 50
Wrought turnings (free from cast)	9 50 to 10 00
Grate bars	8 50 to 9 00
Pipes and flues	10 50 to 11 00
Tank iron	10 00 to 10 50
Hoop and band iron	8 00 to 9 00
Sheet iron	6 00 to 7 00
Wrought drillings	9 00 to 9 50
Stove plate	9 00 to 9 50
Steel axles	16 00 to 17 00
Cast borings	6 25 to 7 00

CINCINNATI.

Nov. 22.

The coke market continues firm with foundry coke quotable at $2.40 to $2.50 and furnace coke at $2 to $2.15 f. o. b. Connellsville.

Pig Iron.—There has been a further strengthening of prices during the week and on Southern iron $13 Birmingham for No. 2 foundry is the inside quotation, while some of the Southern furnace interests are asking $13.50. The buying movement has subsided and the market is quiet. Several important inquiries have come out in the last few days. A large Pittsburg interest is asking for quotations on 12,000 tons. An Ohio pipe manufacturer is inquiring for quotations on 8,000 tons. An Indiana concern wants 2,000 tons of Southern iron for delivery in the second quarter. Another inquiry comes for 10,000 tons of Bessemer for prompt shipment. It is difficult to present correctly the tone of the market under present conditions. Some resale iron which was bought for investment has been offered to consumers during the week at $13 Birmingham without interesting buyers. On the other hand, the attitude of furnaces is strong with an increasing tendency to advance their holding price to $13.50. Buyers are evidently inclined to hesitate and are not following the market with purchases for future requirements at the present level of values. The Southern furnace side of the proposition is strong, based on the inability to increase active furnace capacity owing to shortage in the coke supply and the demand for Southern iron in the South. Continued firmness in the market appears to depend now upon the demand for finished products which will naturally be reflected in the consumption of pig iron. In spite of the several large inquiries in the market it seems plain that active buying has halted for the present. Current quotations f. o. b. Cincinnati are as follows:

Southern Foundry No. 1	$16 25 to 16 75
Southern Foundry No. 2	15 75 to 16 25
Southern Foundry No. 3	15 25 to 15 75
Southern Foundry No. 4	15 00 to 15 25
Southern Foundry No. 1, soft	16 25 to 16 75
Southern Foundry No. 2, soft	15 75 to 16 25
Gray forge	14 75 to 15 00
Northern Foundry No. 1	16 65
Northern Foundry No. 2	16 15
Southern Charcoal	18 75

Finished Material.—The market continues firm with some advance in iron bars and sheets. The jobbing trade is good and orders are moderate in size but numerous. Bar iron is now quoted at 1.50c; steel bars at 1.43c, half extras, with dealers quoting 1.75c for iron and steel out of store. Galvanized sheets are at 75 and 10 and 5 percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are dull and sell out of store at 1.85c for ¼-in. and 1.95c for 3-16-in. No. 8 and No. 10. Beams and channels are quoted at 1.85c from stock, and angles at 1.85c to 1.90c for base sizes.

In merchant pipe there is no change in prices and there is a fairly good volume of business moving. Independent mills are not now so troublesome to the leading interest and there is less difficulty in securing business at the schedule. Car lots are quoted as follows f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ and ¼ inches	67.35	51.35	65.35	49.35
⅜ and ½ inches	71.35	59.35	69.35	57.35
¾ to 6 inches	75.35	65.35	73.85	63.85
7 to 12 inches	70.35	55.35	68.85	53.35

Old Material.—The market is strong and prices are difficult to locate with dealers marking up their prices daily. The following quotations are given as representing the market at the close of the week. We quote f. o. b. Cincinnati.

Old No. 1 railroad wrought, net tons	$14 50 to 15 00
Cast machine and foundry, net tons	12 50 to 13 00
Old iron rails, gross tons	16 50 to 17 00
Old steel rails, gross tons	13 50 to 14 00
Old short lengths, gross tons	13 50 to 14 00
Old iron axles, net tons	16 50 to 17 00
Stove plate, net tons	9 50 to 10 00
Wrought turnings, net tons	10 00 to 10 50
Cast borings, net tons	6 50 to 7 00

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, NO. 150 NASSAU ST., NOV. 22.

Outside of those already noted in billets, tin plates and boiler tubes, advances made during the past week include $3 and $2 per ton in galvanized and box annealed black sheets, respectively, $2 per ton in bar iron, $2 per ton in wire products. No changes were made in structural shapes, plates, steel bars or rails. Several conferences on rail matters have been held recently, the chief matter under discussion being the relation of the Lackawanna Steel Co. to the pool. The company is willing to join the pool, and make the latter's price the basis of all its sales, but does not like the allotment proposed. Another conference will be held in the near future, at which it is believed settlement will be effected.

Pig Iron.—The past week found the market free from flurries and excitement that have characterized it for weeks past, and a healthy basis to trading was in evidence. Ruling prices today are on a slightly higher level than a week ago, with buyers showing a disposition to purchase in smaller quantities at regular intervals, rather than in large lots. Northern irons are very strong, sales of No. 2 foundry having been made at Eastern Pennsylvania furnaces at from $15.50 to $16, for delivery the first quarter of the new year. Southern No. 2 foundry is firm at $13.50 Birmingham, for delivery the first quarter of next year. Buying does not extend beyond this delivery, the furnaces being especially insistent in this respect, although there are buyers willing to talk business with them for the first half. The general situation is a strong one, with confidence growing that present prices are more likely to continue than to recede. No transactions have been closed in foreign irons, although the advantage of local irons is now only about $1 per ton. So far as freight rates are a factor, conditions were never more favorable for iron imports than they are now. New York quotations at tidewater follow, Northern No. 1 foundry, $16.75 to $17; No. 2 foundry, $16.50 to $16.75; No. 2 plain, $16.25 to $16.45; Southern No. 1 foundry, $17.50 to $17.75; No. 2 foundry, $17 to $17.25; No. 3 foundry, $16.50 to $16.75; No. 4 foundry, $16 to $16.25.

Finished Iron and Steel.—The feature of the week has been the movement in structural shapes, railroads being heavy buyers. From this source the American Bridge Co. booked orders for 30,000 tons alone, of which 6,000 tons was from the Pennsylvania, 3,000 tons from the Ontario & Western, and 2,500 tons from the Chesapeake & Ohio. The remaining orders came from the Chicago & Northwestern, Illinois Central, Chicago & Ft. Wayne, and the Northern Pacific. The Boston Elevated will award a contract for 12,000 tons in a few days. Plates continue in excellent demand, and some good orders have been taken. Sheets are looking up, with

buying for forward delivery especially brisk. Bars are active, especially iron bars. No advances have been made as yet in steel bars, but pressure on the leading interest to agree to one is strong. New York prices at tidewater follow: Angles, 3 to 6 in. x ¼ in. and heavier, 1.54½c; beams, 3 to 15 in., 1.54½c; channels, 3 to 15 in., 1.54½c; beams, 18, 20 and 24 in., 1.64½c; tees, 3 x ¼ in. and heavier, 1.59½c; plates, carloads, tank, 1.54½c; flange, 1.64½c; marine and ordinary fire box, 1.74½c; refined iron bars, 1.54½c; soft steel bars, 1.44½c; sheets, in carload lots, New York, No. 28, black, 2.40 to 2.45c; galvanized, 3.40 to 3.50c.

Old Material.—The market during the week was strong, with the demand more active. Holders show no eagerness to sell, believing that a higher range of values is imminent. Reliable quotations are difficult to obtain, being entirely dependent on the material and quantity offered. Old iron rails, heavy scrap, and wrought scrap, are particularly firm, and in good demand. We quote f. o. b. cars:

Old iron rails	$15 00 to 15 50
Old steel rails, long lengths	13 50 to 14 00
Old steel rails, short pieces	13 00 to 13 50
Relaying rails	19 00 to 20 00
Old car wheels	12 25 to 12 75
Old iron car axles	17 00 to 18 00
Old steel car axles	14 00 to 15 00
Heavy melting steel scrap	13 50 to 14 50
No. 1 railroad wrought scrap	15 00 to 15 50
Iron track scrap	13 50 to 14 00
Wrought pipe	9 50 to 10 00
Ordinary light iron	9 00 to 10 50
Cast borings	5 75 to 6 50
Wrought turnings	8 25 to 9 00
N. 1 machinery cast	11 75 to 12 25
Stove plate	9 25 to 9 75

PHILADELPHIA.

Nov. 22.

The listing of pig iron warrants on the Produce Exchange, New York, will, it is feared, stimulate speculation at a time when the only danger is a tendency to speculate. There is unquestionably a sound basis for recent improvement, but the speculative feature is deplored.

Pig Iron.—Scarcity of coke and its inferior quality are interfering with the full operation of some stacks. The market is very strong, but prices have not changed, as $16.50 for No. 2 is apparently the limit for the present. Since recent heavy buying, sales are not so numerous. We quote as follows for Philadelphia and nearby deliveries: No. 1 X foundry, $16.75 to $17; No. 2 X foundry, $16 to $16.50; No. 2 X plain, $15.50 to $15.75; gray forge, $14.75 to $15; basic, $14.75 to $15.

Finished Material.—The mills are well supplied with orders and have good prospects. With the exception of $2 per ton advance in bar iron, prices are unchanged. We quote as follows: Best refined bar iron, 1.53½c; tank plates, steel, 1.53½c; angles, 1.53½c; beams, channels for 15 inch and over, 1.53½c.

Old Material.—Prices are firm and advancing and the demand is strong. We quote as follows: No. 1 steel scrap, $14.50 to $14.75; low phosphorus scrap, $18 to $18.50; old steel axles, $17.50 to $18; old iron rails, $17 to $17.50; old car wheels, $13.75 to $14.25; choice railroad No. 1 old car wheels, $13.75 to $14.50; choice railroad No. 1 wrought, $16.75 to $17.25; machinery cast, $13.50 to $14; No. 2 light scrap (forge), $11 to $11.50; light scrap (ordinary), $9.50 to $10; wrought turnings, $9 to $9.50; cast borings, $7.25 to $7.50; stove plate, $11 to $11.50; wrought iron pipe, $12.50 to $12.75.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Nov. 22.

Pig Tin.—The market during the week was stronger throughout, but during the past two days has shown a tendency to be quieter. The trade situation is fairly satisfactory. London during the week has been fairly active, with spot and futures both firm. Today's closings follow: Spot, 29c to 29.17½c; Nov. 28.95c to 29.12½c; Dec., 28.90c to 29.10c. London's closing today follow: Spot, £132 10s; futures, £132 5s. Arrivals at Atlantic ports for the month to date aggregate 1,590 tons, with 1,620 tons afloat.

Copper.—The leading producers again advanced prices ¼c in all grades during the past week. These advances have been made to serve speculative purposes, and are not based on a corresponding improvement in trade conditions. Consumers, realizing this, are only purchasing when unavoidable. In sympathy with this feeling, the London market has been steady, with prices slightly lower that a week ago. The lever for speculative operations is the alleged heavy exports likely, when as a matter of fact it is absolutely impossible to even approximately estimate these, anything done in the direction being guesswork pure and simple. Today's closings follow: Lake, 14⅞ to 15⅛c; electrolytic, 14¾ to 15c; casting, 14½ to 14¾c. London's closings today follow: Spot, £66; futures, £66 7s 6d. Exports for the month to date amount to 12,315 tons.

Lead.—Spot continues scarce, but is unchanged at 4.60 to 4.70c. St. Louis is much stronger at 4.45c, but London is weaker at £13.

Spelter.—The demand is better and prices are higher, spot selling at 5¾ to 5⅞c. St. Louis advanced to 5½c. London is stronger at £25 5s.

Antimony.—All grades advanced considerably during the week, Cookson's being 9 to 10c, Hallet's, 9 to 9.50c, and other grades, 8 to 9c.

Quicksilver.—We quote $40 per flask of 76½ lb. in lots of 100 flasks. London is £7 15s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for small quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Nov. 22.

Higher prices are being asked for copper, sheet zinc and pig lead. The foreign demand which has curtailed domestic supply is largely responsible for these advances. Buying in this market has not been of active proportion, the higher prices having acted as a check on orders. We quote as follows: Lake copper in carloads, 15¼c, and 15½c to 15¾c for lesser quantities; casting, 15⅛c for carloads, and 15½c for smaller lots. Pig tin, carloads, 29¾c, and 30¼c to 30½c for less than carload lots. Sheet zinc, 6.20c for carload lots of 600-lb. casks, and 6½c to 6⅝c for less than carload lots. Pig lead remains scarce, and is firm at 4½c for 50-ton lots, 4.55c for carload lots, and 4.70c for smaller lots. Spelter, 5½c carload lots, and 5¾c for lesser amounts.

In sympathy with the strong tone of the new product, old metals show an advance in prices. We quote copper wire and heavy, 12¾c; copper bottoms, 11½c; copper clips, 12¼c; red brass, 11½c; red brass borings, 19½c; yellow brass, heavy, 8½c; yellow brass borings, 7¾c; light brass, 6½c; tea lead, 4¼c; zinc, 4c.

The Bessemer plant of the Carnegie Steel Co., Youngstown, O., continues to operate on billets and sheet and tin bars. This plant has not operated on rails for many months and will not be changed over until after the first of the year. An additional converter was placed in operation this week which will increase the production to about 1,800 tons daily.

The Anderson, Ind., plant of the American Steel & Wire Co., recently broke all its previous output records by producing 468,740 pounds of rods in a period of eleven hours.

EDUCATION OF THE APPRENTICE.*

BY J. L. KETCHAM.

A trade school has been started at Indianapolis. The trades offered this year are carpentry, bricklaying, plastering, house painting, electrical work, lithography, foundry and forging. This school is new, but it has good backing and will have an adequate endowment. Its history is brief but interesting.

The United States Government owned 75 acres of land within the city limits of Indianapolis. The land is undulating, covered with forest trees and is beautiful for situation. It was an arsenal and there are groups of buildings on the land, erected by the Government at a cost of $350,000. The Government proposed to give up this arsenal and sell the property. Vice President-Elect Chas. W. Fairbanks suggested that the property be bought for a trade school. The ground was too beautiful to be split up into town lots, and the buildings too good to be torn down. When the United States Government builds it puts up substantial buildings. It does not build in a rush and use any material or any workmen to hurry completion, as is often done by individuals, impatient for returns. Uncle Sam has educated engineers in his army officers, who take time to erect and take pride in erecting buildings of the best possible character.

A large number of citizens of Indianapolis, appreciating the suggestions of Mr. Fairbanks, bought these arsenal grounds and buildings of the United States Government at public sale, paying therefor $154,000 cash. It had been previously arranged that the property would be turned over to the Winona Technical Institute, a school already established, conducting an agricultural institute at Warsaw, Ind. At the head of the Warsaw Agricultural Institute, and now at the head of the Indianapolis Trade School, is Rev. S. C. Dickey, D. D., who has enlisted in his work some of the wealthiest men in the West, chiefly from Pittsburg, Chicago and Cincinnati.

Let me give a brief account of these men, in order that you may see for yourselves that the school has a substantial start. The president is Rev. S. C. Dickey. Suffice it is to say of Mr. Dickey that he was a poor boy, worked his way through Wabash college, borrowing money when a student and afterward repaying with interest all borrowed money, poor as he was. He started the agricultural school at Winona and managed it with such success that men of large means came to his support. J. M. Studebaker, South Bend, is first vice president; H. J. Heinz, of Pittsburg, second vice president; and H. H. Hanna, of Indianapolis, chairman of the executive committee. J. M. Studebaker you all know to be a man of large means, large sympathy and practical experience in handling boys and men, in making vehicles of all kinds. H. J. Heinz, of Pittsburg, is a millionaire deeply interested in the school, as are also Major A. P. Burchfield, H. J. Torrence, H. J. Porter, S. P. Harbison, all of Pittsburg. Pittsburg foundrymen know these men, and know that they are men to carry out their plans and have means to push the work of the school to a finish. On the board of trustees are men from other cities. There is Stanley McCormick, of Chicago; Walter M. Smith, of New York; and Alexander McDonald, of Cincinnati. I name these men, not to boast of their wealth, but to demonstrate to your satisfaction that this Indianapolis trade school, called the Winona Technical Institute, is a success from the beginning. Although the institution is only a year old, Dr. Dickey tells me that it has this start: Contributed by Indianapolis citizens, $133,000, and by others, $21,000, which money bought the property from the Government. There was given by Indianapolis citizens and others, 15 gentlemen, $10,000 each, a total of $150,000. The maintenance fund from 20 men, $5,000 each, is $100,000, and Mrs. Phelps, of Kentland, Ind., gave $25,000. Dr. Dickey assures me he has been shown wills made out by elderly gentlemen with no heirs to the amount of $2,000,000 to be left to the school. The names of men in Indianapolis on the executive committee and the board of trustees are a guarantee of success.

This school proposes, among other things, to teach boys to be molders. That is what interests you and me. The school is not a local affair. I have shown you that the United States Government sold the property cheaply because it was bought for a trade school. Senator Fairbanks, Senator Beveridge and Congressman Overstreet by their efforts and their eloquence induced Congress to let valuable property go for less than it was worth because of the proposed school. The whole United States has thus indirectly an interest in the school. You have stock in it and it will pay you dividends in furnishing you with better molders than you have. The education of the boys in our foundries under the present system of apprenticeship is not the best. I need not tell you that. You know it.

I remember some twelve years ago in my own foundry the graduating exercises of the apprentices, one by one, as they finish their time. Each apprentice as he finishes his time was required to treat, to "set 'em up." The treat consisted of several kegs of beer, which an apprentice was required to buy for the journeymen molders to celebrate his "commencement" as a journeyman. The premium of $100 earned by the apprentice was cut down to $80, the remaining $20 being spent in such enlightened "commencement" exercises. To do the molders justice I will say that they were finally amenable to reason and agreed with me that the custom was barbarous and scandalous and gave it up. Nevertheless, there are yet objectionable customs and practices. A trade school will teach a boy not only the art of molding but also good morals and the art of the "open shop."

The average organized molder, we will assume, has one son. Eight molders have eight sons. One of the eight is permitted to learn a trade. What becomes of the other seven boys? A student of sociology in Columbia University tells what becomes of them. The situation was carefully investigated in New York. It was found that although iron molders allowed one apprentice to eight journeymen, marble cutters one to ten and so on, many labor unions would not allow any apprentices. In consequence, there are 150,000 boys between the ages of 16 and 21 loafing about the slums of New York city. Is there not a need for trade schools? Shall we permit the door of opportunity to be thus shut in the faces of our boys in these Western cities? When a trade school was started in New York ten years ago it was viciously opposed by organized labor. Today the apprentice question is one for the trade school and not for organized labor to solve. Let me present the question to you in a concrete form. Let me tell you what *has* been done by a kindred trade, and thus demonstrate conclusively what can be done by our trade.

The lithographers of the United States found it difficult, well nigh impossible, to get apprentices. Their work they found suffering. The union reserved the right to select the apprentices and they selected only a few and only such as were amenable to union rules. The atmosphere of union rules and practices was poisonous. I am telling what the lithographers tell me. Something, they said, must be done. They decided to start a trade school of their own. But fortunately for them this trade school at Indianapolis, started up, and the lithographers decided to join hands with Indianapolis and assist the branch of the school known as the school of lithography. Belonging to this Western Lithographers' Association there are 50 houses from 16 different States—Georgia, Tennessee, Minnesota, Michigan, South Carolina, Texas, Iowa, Ohio, Missouri, Kentucky, Wisconsin, Kansas, Indiana, Nebraska and Alabama. Widely scattered as they are, their interests are centered in this trade school in Indianapolis,

*Read at the Cincinnati convention of the National Founders' Association, Nov. 17, 1904.

with three trustees to manage for them, viz: Julius Gugler, of Milwaukee; Chas. B. Goes, of Chicago, and Louis H. Levey, of Indianapolis.

Mr. Levey writes me as follows: "I am sending you by today's mail a copy of the Winona School of Lithography booklet. This branch of the institution will be run under the auspices of the American Lithographers Association West, they having three members on the board of directors, and they to have charge of the lithographic school. This assures me that the school will be run along practical lines and that a sufficient number of bright boys will in time be trained into first class lithographers. The Lithographers Association West will furnish about $5,000 in equipment for this school without cost to themselves. If you are interested on behalf of the National Founders' Association I would like to talk the matter over with you at your convenience."

I asked Mr. Levey what he meant by saying that his association would furnish the school $5,000 in equipment without cost to themselves. He was surprised at my question. He thought foundrymen were up to date. Why, he said, we went to the supply men and held them up for tools and machinery, etc. I replied that foundrymen know nothing about "hold up" methods; they were strictly virtuous and would not be guilty of such practices!

Seriously, gentlemen, the success of the Western Lithographers' Association ought to inspire us to do something of the same kind. They started their branch school of lithography. Our school of foundry practice is already started. The object of this appeal is to enlist your sympathy and support. The foundry to which I belong, the Brown-Ketcham Iron Works, has signed an obligation to give $100 each year for five years for equipment. The cards I would like to have you sign are for maintenance. If each of you will give $100 a year to this trade school, for maintenance, your hundred dollars is loaned to some worthy boy to enable him to get through his apprenticeship in the foundry department of the school. He signs a note (Dr. Dickey gave me a sample note; I have it here). The note given by the boy for your money is payable to the school on or before ten years, without interest. Dr. Dickey tells me he worked his way through Wabash College thus, and paid back to the college the money loaned him, and paid it with interest! It was, he says, the happiest day of his life when he paid the last dollar of that note. Very few of the notes are not paid, the Doctor says. The boys are taught to be honest. Integrity is instilled into them and they struggle on until every dollar is paid back. Bear in mind the money is not paid back to you. It is paid back to the trustees of the school and is then loaned to another boy. This is the only perpetual motion machine I have ever heard of. You pay into the Winona Technical Institute of Indianapolis $100 for one, two or three years as you like. That hundred dollars goes to a boy who learns to be an intelligent molder, and while he learns his trade is surrounded by Christian influences. After he graduates, and as soon as he can earn it, the same hundred dollars you gave goes to another boy, and another and another. What a fountain of usefulness you open up. It sparkles in the heart and glistens in the eyes of the lad who gets it. His life is cheered, comforted and made useful; then another heart is cheered and another life made useful—all with this first gift of yours.

We have all read that fascinating story "The Call of the Wild"—A boy denied apprenticeship by organized labor is surrounded by such adverse conditions that the call of the wild is daily, hourly with him. Idleness soon becomes vice; and the boy who might have been an honest workman, becomes first a criminal, then a brute. The appeal to us is from the boy himself. Do you not hear his cry: "I am locked out by union rules. Give me a chance in life! Am I doomed to beg, starve or steal?"

The Bernville Foundry & Machine Co., of Bernville, Pa., has been sold at public sale to Wm. J. Harpel.

EASTERN PENNSYLVANIA.

HARRISBURG, PA., NOV. 22.—Conditions in Eastern Pennsylvania are looking up after a long and dreary season. More furnaces are going into blast and mills and shops report more work than for many weeks. The scale of operations is greater and there are more men employed.

The Carpenter Steel Co., of Reading, is to be reorganized and will be given a working capital sufficient to allow improvements. The regular operation of the works will begin soon.

The Harrisburg Pipe & Pipe Bending Co. is running its new rolling mill and has all of its departments at work and a larger force than ever employed.

Warwick furnace No. 2 at Pottstown, has been started after being idle for months. It has 3,000 tons weekly capacity.

The Tidewater Steel Co. has sublet contracts taken some time ago, not caring to operate its mills at Chester on the orders.

The report of the receivers of the Susquehanna Iron & Steel Co. mills at Columbia and other places show that the plants have been prospering under their management.

Topton furnace has been started by the Empire Steel & Iron Co. The stack has been idle for months. The company is putting more of its stacks into blast.

The United States Steel Corporation will dismantle the mill at Duncansville, near Altoona, which has been idle for a long time.

J. P. Luce, manager of the tin plate mills of the Lalance & Grosjean Co. at Harrisburg for years, will embark in the general foundry business in this city. He has taken the old Bay foundry.

The Harrisburg Foundry & Machine Works report more orders for engines for electrical plants than for a long time. The Pittsburg Brewing Co. recently gave its twentieth order for engines to this firm.

Six of the seven blast furnaces in Dauphin county and about half of those in Lehigh and Berks counties are now in blast. The Reading district will show an increase in a short time.

The Thomas Iron Co. has started its Keystone furnace after a long idleness. Marshall furnace, near Newport, has started up.

G. B. Walker, of Riverton, has invented a method for making welded link chains by a new process. He may establish a plant.

The Lebanon Iron & Steel Co.'s affairs are now in the hands of a master of the United States Court. The sittings are being held in Harrisburg.

The McCullough-Dalzell Crucible Co., of Pittsburg, Pa., has just completed the erection of a new dry house, which is one of the buildings used in connection with the manufacture of crucibles, it being necessary to dry the imported clay and expose it to considerable heat for some time before using it in the manufacture of crucibles.

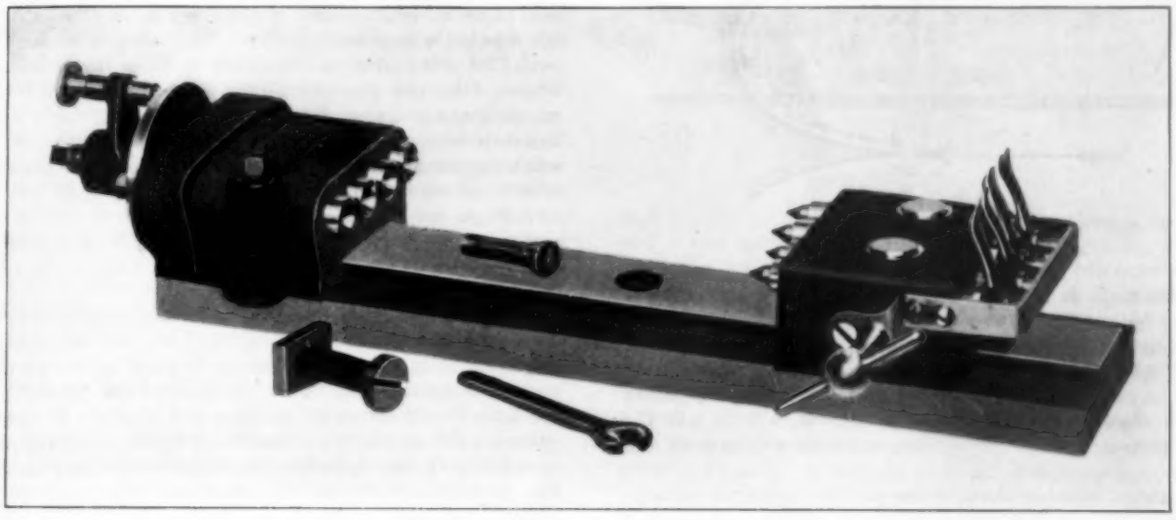
The foundry business at Glenville, Pa., formerly carried on by S. R. Miller and G. M. Beard, has been changed, Mr. Miller going out of the partnership and Mr. Beard continuing the business in the same place.

The United States Government has just purchased from Rand Drill Co., 27 Imperial pneumatic hammers and drills. These are to be used in connection with the Manila harbor improvements.

The Timblin Engineering & Foundry Co. has decided to move its plant from Creighton to Avonmore, Pa., and is in the market for considerable new machinery.

FOUR-SPINDLE INDEX CENTERS.

For various manufacturing operations on small pieces, such as fluting, splining, flatting or squaring ends, etc., multiple centers are a valuable means of increasing production; a number of pieces are operated on in the same time, and with the same attendance that would be required for one piece. A four-spindle set of centers with collet chucks as shown, is made by the Garvin Machine Co., of New York. The headstock spindles are hollow, so that work can be passed clear through; and are fitted with standard watch lathe collets, operated from the rear. The dial is fixed and the spindles are indexed simultaneously by but one handle. In tightening the collets, all strain is taken off the dial and pointer, by locking the spindles with the binder bolt seen at the side of the headstock. The tail block is adjustable along the base; and each spindle has an independent movement forward by spring and is thrown back by separate handle. The spindles are bound simultaneously by one handle. The center distance of spindles is 1¼-in. A larger size with 2 in. centers is also made.



FOUR-SPINDLE INDEX CENTERS.

Electric Traction from Gas Power.

The Warren & Jamestown Street Railway Co. is equipping an alternating current, single-phase electric railway system to operate between Warren, Pa., and Jamestown, N. Y., for which power will be supplied by gas engines operating upon natural gas. The equipment is now being constructed by the Westinghouse companies at East Pittsburg, Pa. The power station will be located at Stoneham, Pa., two miles from Warren. The initial equipment will consist of two Westinghouse gas engines each of 500 b. h. p. capacity. They will be of the horizontal single-crank double-acting type, direct connected to two 260-k. w. Westinghouse generators furnishing current at voltage sufficient for direct use upon the high tension transmission line. The power equipment also comprises a 55-h. p. Westinghouse gas engine for operating air compressor and exciter unit. Natural gas will be used, furnished by the local distributing company. In this district the gas has a calorific value of about 1,000 B. t. u. per cu. ft. Transformer substations, five in number, will be located along the right of way. The present motive power equipment will comprise four quadruple sets of Westinghouse single-phase motors each approximately 50 h. p. capacity. A feature of the system is the arrangement for operating alternating current motors upon the direct current trolley lines within the city limits of the termini. The Warren & Jamestown street railway has operated part of the present lines for a period of eleven years. Three years ago the company began experimenting with the use of gas power, with sufficient success for the now exclusive adoption of gas engines for its entire power generation.

The Lewis and Clark Centennial Exposition at Portland, Ore., opens June 1, 1905, and closes Oct. 15, 1905. The exposition grounds cover 407 acres. The United States Government has appropriated for buildings and exhibits, $475,000; the Oregon State Legislature appropriated $500,000; the citizens of Portland subscribed and paid in $500,000; approximate cost of the whole exposition is $5,000,000. No charge for space is made to bona fide exhibitors; electricity, steam, gas and water furnished at very reasonable rates; live exhibits will be given preference in the allotment of space; the exposition grounds and buildings will be constituted a bonded warehouse. The Lewis and Clark Centennial Exposition celebrates the 100th anniversary of the exploration and annexation of the "Oregon Country," now comprising the States of Oregon, Washington, Idaho and large portions of Montana and Wyoming. Henry E. Dosch, director of exhibits, is located at the Oregon building, World's Fair, St. Louis.

The first offer of a site for a branch library in the city of Philadelphia, when the gift of $1,500,000 by Andrew Carnegie was announced, was from the Baldwin Locomotive Works. The announcement of the gift was not 48 hours old before John H. Converse said on behalf of the company that it would donate a suitable site for one of the branch libraries in the Fifteenth ward, in which the extensive plant of the company is located. Last week he announced that the company was ready to make that promise good. The company has purchased a site 80 x 100 ft. almost in the center of the manufacturing district where fully 35,000 persons are employed the year round. The property was acquired at a cost of about $50,000. The library building will include an auditorium or lecture room where free lectures of a popular nature will be given.

The lower house of the Austrian Provincial Diet has adopted almost unanimously a motion requesting the Government by legislative means to immediately check the action of the iron cartel in raising prices and to facilitate the importation of pig and rolled iron by a reduction of duties so that Austrian producers may be enabled to make concessions to consumers.

Simple Steam Turbine Engines.*

BY JOHN RICHARDS.

It is a strange fact that the "evolution" of steam turbines is following a course quite the opposite of that of piston engines. In the latter, the constructive part was developed and in a great measure completed before the thermal or thermodynamic features were investigated and explained; and, as a matter of fact, ignoring the modern demands of increased speed and pressure, the constructive feature of such machines has not greatly advanced in recent times. Some of Watt's steam engines remained in constant use for a century, and many old engines made in this country had a record of 50 years and more; but, as remarked, the thermal or thermodynamic features that pertain to the art have only in recent times become understood and applied. Thirty years past will include what may be called the scientific evolution of piston or pressure steam engines, and, with some exceptions, will include the development of their proportions and their arrangement into types.

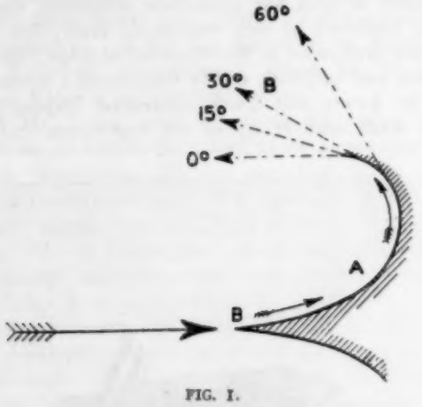


FIG. 1.

In steam turbines, the scientific part has preceded the constructive one; in fact, was complete in essential points when their practical construction and use began. This was, of course, because all steam and heat engines are governed by the same general laws, with the difference that turbine or impulsive engines deal with the flow and gravity of steam instead of its pressure, and hence are more complicated in several respects, but, as before remarked, they follow certain ascertained laws which govern heat engines in general.

A principal fact, relating to turbine engines now in use, is that while this term is applied to all kinds of steam wheels driven by impact, reaction, or pressure of steam, there are two types that are quite distinct as articles of manufacture. One of these types I will call "single" acting, the other "stage" acting. These types are best known in common speech by the names of inventors who have in recent times been most prominent in their development; the single acting as the De Laval or Riedler type, the stage or double acting as the Parsons type. Another type, that will have some notice hereafter, is the reaction type, not commercially made at this time, but a "parent" of the whole, as will appear. The two first named types of engines are also designated as impulse and pressure machines, but these terms do not very clearly define just what is meant; they are, however, as nearly descriptive as any that can be selected for the purpose. The action to be described in these cases will be better understood by saying that one operates by "push" and the other by "blows." One is free running or open, the other inclosed to maintain pressure.

Of steam turbines, those of the stage or Parsons type are at this time the most numerous and the best known, and they have engrossed the thought and skill of many able engineers. They correspond in many respects to inclosed or pressure water turbines of the Jonval, Fourneyron and centripetal types, which act mainly by "push" or pressure, but not by sustained pressure in the same way as in the action of pistons. The stage or successive action of the steam in this type of engines has for its main object the reduction of speed and rate of revolution, thereby adapting the machines for coupling directly to pumps, dynamos, marine screws and so on. It also avoids the enormous centrifugal strain set up in single-action machines.

Turbines of the single-action or impulsive type are open and without maintained pressure, as in the tangential, Girard and other unfilled water wheels. Consequently they have no running joints to maintain against steam pressure.

The main distinction between steam and water turbines arises out of the different natures of the two fluids. One is elastic and light, the other inelastic and heavy. In the case of water the velocity of efflux is low and in proportion to its density, reaching a velocity of about 80 ft. per sec. under a head of 100 ft., or a pressure of 43 lbs. per sq. in.; but in steam the velocity is immensely greater. The velocity, in feet per second, of efflux from nozzles equals 60 times temperature in degrees Fahr. plus 460. This gives a velocity of 1,680 ft. per sec. for steam at a pressure of 100 lb. per in.; but this is much less than is now assigned for actual efflux from nozzles on which the speed of turbines must be computed. The practical velocity of turbine wheels is computed on a flow of 3,000 to 4,000 ft. per sec., and for the vanes from 1,200 to 1,500 ft. per sec., or 75,000 to 100,000 ft. per min. This is more than 12 times the rate of the fastest railway trains, and, as a physical fact, almost evades the power of conception.

Otherwise than as to the great difference in their velocity, steam and water turbines follow like laws; the spouting energy, as it is called, being theoretically equal to the gravity; or, in other words, the "blow" is equal to the "push," provided the kinetic energy of the impact or blow can be equally utilized. The action of all unconfined liquids is expressed in an old rule (it may even be called a gospel) of fluid motors: The fluid must "enter without shock and leave without velocity." This rule, applied to any motor driven by the impulsive energy of a fluid, will determine the correctness of the machine's operation, or, as it is called, its efficiency, meaning the useful effect produced in proportion to the weight and velocity of the fluid consumed.

To further explain this action of fluids, if a stream is directed against a fixed flat surface, only a portion of the energy is imparted to the surface, about one-half in fact. The entry is a shock, and the fluid is scattered in a lateral direction with violence and leaves with velocity. If the same stream of fluid is directed tangentially into a curved vane or bucket, as in Fig. 1, and if its course is gradually reversed, it will leave with velocity, and that much of its energy will be lost; but if the bucket or vane A is set in motion with the fluid at one-half its velocity, then, by the component of these motions, the fluid will be brought to a state of rest, and will leave without velocity, the buckets receiving the total energy less fluid friction and some loss due to the divergence of the lines B. This is the manner of operating in all fluid motors of the impulse type or of single action. The tangential en-

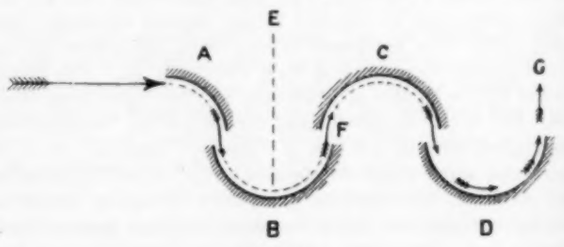


FIG. 2.

*From a paper read before the Technical Society of the Pacific Coast at San Francisco.

trance of the jet or stream and the resultant or discharge angle are very important features in practice, and will be again considered at some length, not in respect to economy alone, but as materially modifying construction in several ways.

Reverting now to the filled or pressure class of turbines for water or steam, these operate in a different manner, by what is commonly called pressure, but not pressure within the usual meaning of this term. "Obstructed flow" comes nearer describing the operation. The course of the fluid through the machines is made so tortuous or difficult, by means of reversing or baffling curves or vanes, that the gravity or pressure of the fluid acts like a static force. Fig. 2 illustrates, in an imperfect way, this action, the large arrow, in this as in other diagrams, being employed to show the line of impingement or course of the fluid. If all the vanes or buckets, A, B and C, were fixed, it is clear that the water would be discharged at G with reduced velocity, even if it were confined; but if the vanes B are set in revolution in the plane at E at half the velocity of the water, it will be left at F in a state of rest or without velocity. If the vanes B are set in revolution at one-fourth the velocity of the water, there will be a residual discharge of force at F, to enter the third set of vanes C, these latter revolving in an opposite direction, so the speed of rotation of any set of moving vanes will be reduced accordingly. If the vanes C are fixed, and discharge into a fourth set of vanes D, the rate of rotation can be reduced again as the square root of the water's velocity in the two cases. This is the manner in which the speed of stake turbines is reduced. The vanes A and B may represent a common water turbine. With the vanes C fixed and those at B and D moving, we have a two-stage steam turbine, except that in all cases the buckets or vanes, whether for steam or water, are of ellipsoidal or other modified curves. Water turbines of this class have commonly only two sets of buckets or vanes, A and B, for example, one fixed and the other movable. Stage steam turbines have from 5 to 10 sets of vanes, the mobility of the fluid demanding this difference. All motors of this class are called "filled," the induction and eduction passages being approximately of the same size in the case of water wheels, but increased, of course, for elastic fluids to accommodate their expanded volume.

It is common to begin the history of steam engines with an account of the "æolipile," made in Egypt about 2,000 years ago, by Hero, a Roman architect. This device, with which almost everyone is familiar, is illustrated by Fig. 3. It is an organized steam motor, much better than some made at this day;

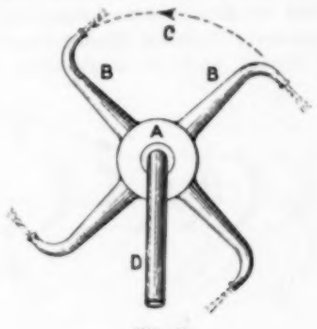


FIG. 3.

and, considering the circumstances of the time, was a wonderful production, evincing, as it does, a knowledge of the expansive force of steam; also the principle of reaction. A is a rotative steam-containing vessel, B B are hollow arms delivering jets of steam tangential to the path of revolution C. Supposing the vessel A to be filled with steam from a pipe D at a pressure of 100 lbs. per sq. in. and the area of each jet to be 0.1 in., or together 0.4 in., then the pressure on these orifices, if closed, would be 40 lbs. When open, there is no pressure on this area, but an unbalanced back pressure of 40 lbs. in the opposite direction, the turning force, due to reaction or unbalanced pressure. A mathematical treatment of this matter would involve the ponderable matter discharged, its velocity and other intricate conditions; but the theory of unbalanced pressure will answer for present explanation.

This Hero wheel was a reaction turbine, and, as such, was a much more complicated and ingenious conception than the direct acting or impulsive wheel of Branca, which followed in 1628, about 800 years after Hero's æolipile. This latter device can scarcely be considered an invention; but it must be remembered that the expansive force of steam was, even at that

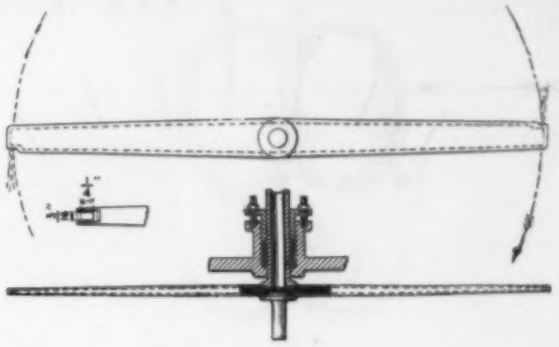


FIG. 4.

date, a mystery. No useful application of this device is known, and it was only a toy, consisting of a wheel with flat vanes against which a jet of steam impinged.

From this point the art seems confined to England, or mainly so, and from 1784 to 1901 there were granted in that country more than 400 patents for machines that may be classed as, or with, steam turbines. Even James Watt, John Ericsson, Perkins and other well-known steam engineers "had a try" at these obdurate machines without permanent result, and an inference, to be drawn from the copious array of schemes proposed, is that the principal impediments were in various operating conditions now better understood and mainly the want of resources for constructing machines to move at such great velocity. There is also the fact that, in so far as principles or modes of operating are concerned, these inventors anticipated about all that is known in the present steam turbine practice, except in the respects just named. Kemplein's engine of 1774 was a reaction one, with the arms and vents as in the æolipile of Hero. James Watt's machine of 1784 was similar in operation, with this difference, that he proposed to vent the steam under mercury or other fluid. Sadler in 1791 devised a compound machine or one of double action, also of the reaction type. Trevethick in 1819 proposed a reaction machine, and John Ericsson in 1830 patented a very well designed reaction wheel. In 1843 Pilbrow patented a stage turbine with a large number of fixed and moving vanes or buckets arranged for expansion. Indeed, his machine had all the main features of modern engines of the stage type. In 1848 Robert Wilson patented the first radial flow steam turbine, which in design fully anticipates the Dow and other radial flow machines of our time. He also proposed a parallel flow engine with expanding chambers or spaces, in the manner of Parsons. In 1888 Alexander Morton, a well-known engineer of Glasgow, Scotland, made experiments with a steam turbine of ingenious form, and other inventors in Scotland made reaction machines that were said to be applied to practical work; but undoubtedly the principal part in the history of reaction engines was the invention of William Avery, of Western New York, who, about 1825, made and put in successful operation a large number of such engines. Mr. Avery was a near relative of Prof. John E. Sweet, president of the Straight Line Engine Co., of Syracuse, N. Y., to whom I applied some time ago for information respecting the Avery engines. Professor Sweet replied as follows:

In respect to the history of the Avery engines, these were made 75 to 80 years ago by William Avery, a local mechanic here. There were about fifty constructed and put in use. One of the runners is now in my possession; another, that I saw years ago, had a hollow shaft of perhaps 1¼ in. bore. The head or runner was of sword shape, the arm 1 by 3 in. at the center and ⅜ by 3½ in. at the ends, the diameter swept being about 5 ft. Steam was admitted through the shaft by means of a stuffing box, passed through the shaft to the hollow arms and escaped at a tangential issue ⅛ by ¼ in., at the rear corners of each arm, the ends of which were stopped by plugs brazed in. Owing to the rapid rotation of the arms—

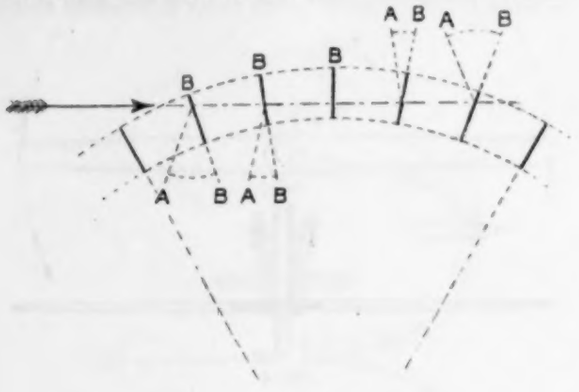


FIG. 5.

10 to 15 miles per min.—the front edges were so rapidly cut away that replaceable blades made of tempered steel were inserted so they could be renewed. The fact that the engine had to be taken to a blacksmith shop every three or four months for renewal or repairs had more to do with their abandonment than their lack of economy. As to the latter, people who knew the facts, or claimed to do so, said that when they changed to the common slide-valve engines there was no gain in steam economy over the Avery engine. Another feature that worked against the Avery engine was the stuffing box around the shaft, which in the hands of workmen of that time was apt to be set up so as to consume a large part of the power in friction. This was a natural consequence, as the wear was rapid. What the result would have been with a truly ground shaft in a metal bush, instead of a turned shaft and stuffing box, making the issues expanding nozzles and multiple expanding by two or three arms in separate cases and connecting to a condenser, is not known. It might rival a pretty good modern engine, if not the best. The Avery engines were used in saw mills and woodworking shops of the time. They had weak starting power, and did not need much for the uses named. They ran at such a fearful speed that the reducing motion was an impediment. Mr. Avery had to employ bands, which were far more objectionable than gear wheels. The Ruthven and also the Gorman engines of the same type are mentioned by Prof. Rankine in some of his writings and claimed as attaining an economy equal to piston engines of the time.

Professor Sweet sends, with his communication, a drawing of the Avery impeller in his possession. This is shown in Fig. 4, and it must be admitted that the circumstances described form a principal fact in the history of free-running engines. The economy attained, even if there were no other fact than that of fifty or more engines being made and put into practical use, is enough to amaze one when it is considered that the engines were purely reactive like a Barker water wheel or the Hero engine in Fig. 3, and that the inert fluid under atmospheric pressure was left directly in the path of the impeller's arms, and wore away the front part where the pieces were inserted. The casing was no doubt of a form to prevent free revolution of the spent steam, otherwise this impediment would to a great extent have been avoided. This machine admits of further comment, especially in its constructive features, and I have no hesitation in claiming that the material is in this case better disposed to resist centrifugal strain than in any steam turbine now being made. The speed was no doubt equal to that of machines now constructed. The structure is not exposed to incomputable inherent strains, as continuous wheels or disks must be, and the box section, made of thin metal plates, is the strongest known in the arts.

In a letter received from Mr. Charles Brown, of Basel, in 1903, I find the following remarks respecting the Avery engine:

Early in the forties an American engineer by the name of Pratt told me that he had experimented with two of Avery's Hero reaction wheels, one with 100 lb. steam running at 45,000 ft. per min. It gave 30.3 h. p. and consumed 7½ lb. per h. p. hour, and another with 130 lb. steam giving 24½ h. p. consumed 6.16 lb. running at 54,000 ft. Diameter at nozzles 5 ft. If these data are correct the result compares well with a 30-h. p. Laval, which, non-condensing, consumes fully as much coal as the old Avery. Pratt told me that Avery had built a locomotive with his wheel. Avery's engine had the advantage over the Laval that the number of revolutions, 2,800 to 3,600 per min., are so low that it might be used for driving many machines without the intervention of gearing, so that it might be worth while to take up the study of the Avery again, for the wear and tear of the Laval gearings is heavy. For heavy work, the Parsons is not likely to be superseded for some time yet, Brown, Bouverie & Co. are crowded with orders, and the works are in a chronic state of expansion; the large sizes are so much more economical that the piston people have no chance. Latest test gives 8 lb. per indicated h. p. hour.

The next step in practically applying the free-running steam wheel to useful purposes was, so far as I know, by Dr. De Laval, of Stockholm. I was often in Sweden during the earlier experiments there, and imbibed a curiosity and interest in this matter that has lasted ever since, especially since coming in contact with the tangential type of water wheels on this coast. The latter are operated under pressures much greater than has been attempted with steam motors; that is, up to 900 lb. per in., giving a velocity of 120 ft. per sec.

Following Dr. De Laval and perhaps others in steam turbine wheels of single action, came a successful division into stages by Hon. A. C. Parsons, one of the most eminent steam engineers of our time. This subdivision, it may be called, of the steam turbines, had for a principal object, as before pointed out, a reduction of the speed of wheels and their adaptation to direct driving of dynamos, marine pumps, screws and the like, offering uniform resistance or load. Wheels or engines of this type involve the maintenance of running steam joints between the stages, and demand workmanship that is now and will likely remain a bar to their general manufacture. There is also an inability to endure lateral stress on the spindles, because the running steam joints that separate the stages of pressure have a clearance of about 0.01 in. These latter features have confined the engines to purposes where simple torque is delivered, but this includes a great part of the whole field of motive power. Professor Riedler has, in conjunction with Professor Stumpf, produced single-action engines up to

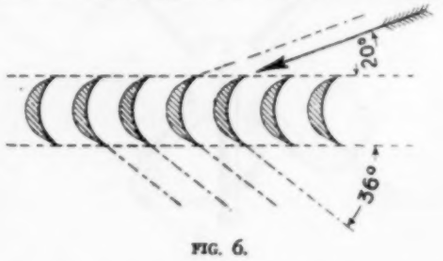


FIG. 6.

2,000 h. p., apparently of durable but expensive construction.

The mechanical construction of machines should be approached by analysis of their operating conditions. The latter are not amenable to computation, except a few, such as the strength of material, normal strains, endurance or wear and so on; but beyond these things lie what may be called the "phenomena of operation," that must be learned by observation, inference, analogy, and, for the most part, empirically. To illustrate what I mean: The generation of electric current by dynamos was a well-founded science long before there were durable and reliable journal bearings for the armature spin-

dles, and these are now a survival from endless modification. The commercial factors of symmetry, cost, endurance and many other qualities belong in the same category and are not computable.

The free running fluid machines, those which operate by impulse and reaction, have a "time function" to deal with, and their speed is a determinate quantity, based upon the flowing velocity of the impelling or impelled fluid. This class embraces water wheels of all kinds—gravity, impulsive and reacting; also steam turbines. The velocity of this impulse class of machines is inversely proportional to the density or weight of the fluids that impel them. A centrifugal pump and a rotary fan seem very different machines, but they operate according to the same law, and their speeds are inversely proportional to the weights of the fluids, or as 800 to 1. This indicates the great velocity at which single-action steam turbines must move, practically about 90,000 ft. per min. Such a velocity produces various phenomena, such as the disturbance and stretching of the rotative parts by centrifugal strain; tendency to vibration, noise, the heating and wear of journal bearings and other things. The centrifugal strain can be imagined when we reflect that one pound of metal, on the periphery of a wheel 2 ft. in diameter, will, at a speed of 10,000 revolutions per min., represent a centrifugal force of 34,000 lb. or 17 tons.

Referring now to the constructive features of steam turbines, the first thing considered will be the buckets, and at the beginning I will claim that these are at fault in modern practice because of being curved in one plane only; consequently they have but one correct position in the jet throughout the whole arc of their movement and in nearly all cases are cut out of solid metal, and have angular or imperfect corners. This form of bucket is due no doubt to the difficulty of machining the surfaces except in straight lines, but it produces, in turbine wheels, several features of construction that are far-reaching in effect, also far from apparent until carefully examined. It increases the weight and number of buckets about five-fold in the attempt to secure impingement of the steam jets normal to the straight faces of the buckets. It distorts the course of reaction from a possible angle of 15 degrees to an angle of 20 to 30 degrees required to secure clearance. It makes necessary a side application of the jet, introducing lateral stress on the wheels and inducing vibration. It augments, in proportion to the added number of buckets, the amount of fluid friction, not to include the resistance of corners. The disposition of material in solid disks prevents the employment of its fibrous or laminated nature in the direction of strain and demands very expensive homogeneous material, a result indirectly of the numerous buckets. This is a bold arraignment

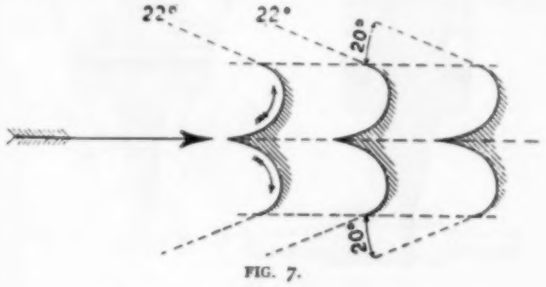


FIG. 7.

of certain constructive features, and would require great temerity on my part to bring forward were I not fortified by something stronger than inference and personal experience in this matter. I allude to the tangential water wheel practice on this coast, which has passed through a crucial course of development that furnishes copious suggestion for single-action steam turbines.

The number of buckets is a very important matter. It is a sequence of the angle of impingement, and this again is a sequence of the bucket's shape. The surface or fluid friction, which offers a considerable resistance and loss, is in proportion to the number of buckets employed, and should be considered in this connection. Most of the steam turbine buckets now made have angular corners, and, when there are not such corners, the end walls of the buckets are so distant from the jet as to lose reactive effect in that direction. We long ago learned to keep water out of sharp corners in buckets. In respect to the number of buckets or vanes, Fig. 5 shows how the line of impingement varies in respect to the straight faces of radial buckets, being as the sine of the angles A and B; and there is no way of securing impingement even approximately normal to the straight faces, except by employing a

FIG. 8.

large number of buckets set close together. The result is much the same whether the jets be applied on the side or tangentially, as shown in Fig. 6, where the angle of entrance is 26 degrees and that of discharge 36 degrees. The trend of practice in tangential water wheels has been to wider spaces between the buckets, better angles for discharge, and, recently, to uniformly curved buckets. This feature of oblique impingement is accountable for at least three-fourths of the buckets now employed, and the result is loss by increased surface friction and distortion of the angle of reaction.

Fig. 6 shows approximately the entrance and discharge angles in the De Laval engines, embracing an arc of 56 degrees, which, by reducing the number of buckets, could be reduced to 36 degrees or less if the problem of oblique impingements were out of the way. Fig. 7 shows spacing for tangential buckets to secure an easy discharge at 20 degrees.

In the Riedler turbines, the angle of discharge is 180 degrees. In other words, the discharge is opposite the jet, but this calls for increased surface, more width and weight for the revolving member, and expensive work in construction, which are hardly offset by countervailing advantages, and which prevent a cheap and general manufacture of the machines.

The contention is that the buckets of steam turbines should be curved in all planes approximately as shown in Fig. 8, taken from a form of water buckets of a very advanced type by W. A. Doble. These are of double concave or cup form, in order to permit direct and balanced impingement at the various angles in which they are presented to the jet, and have a central dividing wedge to permit tangential application. This latter is not presented as a new idea, being simply the final form and method for tangential water wheels on this coast, after more than 25 years of continuous experiment and the attainment of an efficiency that is, if not final, so nearly so that a very narrow margin of avoidable losses remains. If there exist any reasons why this same system or method of operating is not applicable to buckets for steam, I am not able to perceive it. Of course, expansion of the steam and divergence of the jets would call for modification not determinable until a form of nozzle and the contour of the jet are assumed. Not knowing how far the contour of a jet of steam will permit its passage through notch A, in Fig. 8, I am not able to say how far this feature is applicable to an elastic fluid, or how far such a passage as that at A would become a spillway when a jet was impinging at the opposite end of the bucket. I will

not discuss this here, further than to point out that this passage A avoids passing the rim B of the bucket through the jet and the disturbance that must result from this cause. The dividing wedge C permits tangential application of the fluid and produces a shallow and balanced discharge. As a feature of impulse fluid motors, it has not met with analysis and adoption except on this coast and in the Riedler steam turbines. The avoidance of side stress on wheels, especially on steam turbines at their enormous speed, is important, and so is the dual discharge which permits a more nearly uniform velocity throughout the discharged water section, because the latter is shallower. After many years of practical experiment, as well as some spent in scientific work, the dividing wedge was con-

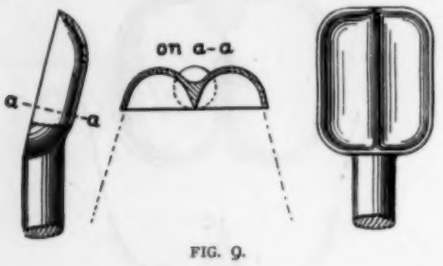


FIG. 9.

firmed at the University of California in 1883 as a permanent feature of good practice for water.

In Fig. 9 is shown a form for buckets capable of receiving and properly reversing a jet of steam coming within angles A and B, and permitting the number of buckets to be reduced to what will come within and cover the divergence or expansion of the steam jet, or about one bucket for each 8 degrees of arc for wheels from 20 to 40 in. diameter. This is less than one-fifth the number now employed for wheels having buckets straight in one plane, as in Fig. 6. Such buckets can be stamped out of fine steel and made strong, smooth and integral with their radial supporting stems. They can be made of uniform thickness, with no more metal than their operative functions require, and of less than half the weight of those cut from solid metal, so that, compared with the usual form of steam turbines, there would be one-fifth the number and (excluding the fastenings) less than one-half the weight, so that the mass in the rim of a turbine wheel with this form of bucket can be reduced to one-eighth or even one-tenth of that in common practice.

As to wheels or disks, nearly all now in use for single-action engines are solid disks, as shown in Fig. 10, a matter much to be wondered at if we consider the strains. Not everyone has had the opportunity of seeing disks at high revolution, circular saws, for example, which, at a speed of 10,000 ft. per min., assume a sinuous path at their peripheries and lose their stability by stretching. A bucket, weighing an ounce, and revolving in a circle 24 in. in diameter at the rate of 10,000 revolutions per min., will exert a centrifugal strain of one ton, and its supporting sector and fastenings will exert 50 percent more—a result scarcely conceivable. The disposition of mass, strains and section may mathematically produce a body of the spindle form shown in Fig. 10 and in all diagrams that have been worked out by computation, but I do not believe that practical experiment will evolve anything of this kind. Assuming this centrifugal force applied to a sector of a solid disk of uniform section, a circular-saw plate, for example, the error of such construction becomes apparent. The disposition of the material, in a sector of the wheel of which the bucket is the outer end, will be inverted, so to speak, and disposed inversely as the strain. The perimeter has no function requiring a continuous mass there, unless it be to hold a series of buckets set close togther or to provide mechanical fastenings for them. To compensate this contradictory disposition of material, the wheels are commonly made in lenticular form, as shown in Fig. 10, so that the mass of a sector is approximately a radial body of nearly equal section, apparently providing for centrifugal strain if change by elongation is ignored; but this latter is the principal fact of all, and one which cannot be provided for in a solid disk of any form, because the conditions are not ascertainable. A very extensive analysis of such disks or wheels, made by Frank Foster, was published in *The Engineer*, London, Jan. 8, 1904. It is a study in mathematics of a very abstruse and no doubt interesting nature to students in calculus, but the weight and cost of such disks, if there were no other reasons, preclude their use for plain simple engines, such as those to which these remarks are directed. Professor Riedler seems to disregard such theories respecting the disposition of material in his disks.

I have shown how four-fifths or more of the weight in the periphery or rim of such wheels can be dispensed with, and I will suggest for the body of the wheels a construction which will eliminate inherent strains due to elongation or stretching, and at the same time dispense with the greater part of the mass and reduce the centrifugal strain accordingly. In wheels moving at such high velocity, certainly the first thing should be to remove from the disruptive zone all joints and mechanical fastenings. These must necessarily include an extra mass of inert material at the points of juncture, plus bolts, rivets or other means of attachment. Buckets or other parts fastened by dovetail joints are open to the same objection, because extra substance must be added to endure compression and holding strain. The construction shown in Figs. 11 and 12 is suggested, the buckets being made independent, avoiding circumferential strain and permitting free elongation by centrifugal stress. The spokes B are tapered, so that their sections will stand the centrifugal strain within the mass lying outside of any point. They are fastened in a nave by welding or by suitable mechanical means, the strength of which will equal their section. The nave will not expand and become loose on a spindle with the amount of weight in a wheel constructed as shown.

In respect to gearing for transmission, I believe that the principal impediment is a want of confidence. Nowhere in the arts have we been called upon for translation at such high velocity; consequently we are not prepared to provide devices such as are required to reduce the speed of single-action steam turbines, where the elements of transmission have to move

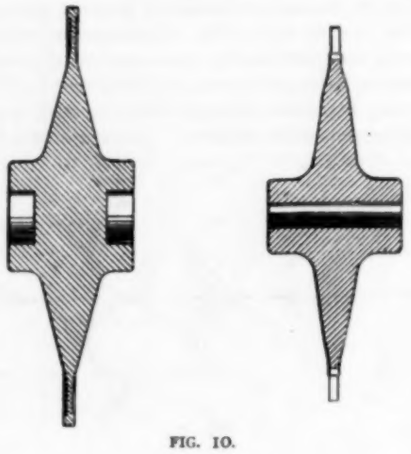


FIG. 10.

from 4,000 to 6,000 ft. per min. I know of no reason why plain tooth wheels, or tangent gearing, will not run at this speed, and I confidently expect that they will do so without any objectionable result. Respecting tooth gearing there is much apprehension, which arises from the difficulties of constructing it in perfect form. In the Continental Hotel in Philadelphia a screw elevator was in use for more than twenty years. A bevel wheel of 5 ft. diameter and a pinion of 10 in. diameter drove the screw, and they were absolutely noiseless.

They were made at the Industrial Works in that city, where I was working at the time.

In an experiment made many years ago, at the works of William Sellers & Co., to test the ultimate speed of transmitting apparatus, bands of one kind or another were employed up to a point of failure, then plain spur wheels were resorted to, and, as I have been informed, they were entirely successful to the point of disrupting a steel disk driven by the gearing. Of course, such gearing to run without noise must be perfectly made; and, if there is reason why they will not transmit at 4,000 to 6,000 ft. per min., I fail to perceive it, especially when inclosed in the turbine wheel chamber, as hereafter suggested. Twenty-five years ago I constructed machines in which bands of flax webbing ran at 6,000 ft. per min. without difficulty. These bands drove spindles at 12,000 ft. per min., and the machines are yet in use in Columbus, O., where they were made in what might be called a country shop. For a good many years I was engaged in designing and making machines in which the spindle bearings had a velocity of from 2,000 to 3,000 ft. per min., were subject to lateral strain and mounted in weak framing, and they ran cool when the fit and alignment were good. Consequently I am in no way alarmed at the requirements in steam turbine practice, and I confidently expect to see power transmitted by bearings moving at a surface velocity of 5,000 ft. per min. and spindles run cool at 10,000 to 15,000 r. p. m.

In my opinion, the gearing of transmission should be inclosed with the motor wheel, and should operate in the vapor contained in the casing, that being open to a condenser. There are three reasons for this: The better performance and wear of wheels when steam lubricated; the absorption of noise, if that be present; and the avoidance of packing glands on the spindle of the motor wheel, a very objectionable feature, present, I believe, in all the steam turbines now made. Such packing glands are objectionable not only because of a possible resistance and loss of power by friction, as pointed out by Professor Sweet, but because they permit the entrance of air into the condenser and involve the wear and care of packing.

The interior of the wheel casing should be annular, turned smooth and otherwise so arranged as to permit the free revolution of any vapor it may contain. It has been suggested that a sector or spoke construction of the wheels would cause serious resistance by windage or fanning the steam or vapor in the casing; but the attenuated vapor in a casing, 10 to 12

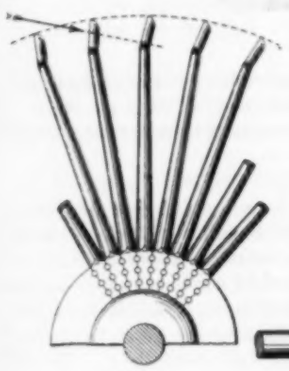


FIG. 11.

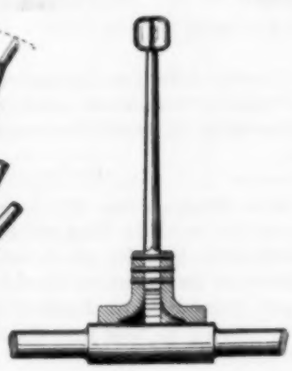


FIG. 12.

lb. below the atmosphere, would not offer much resistance if fixed, and perhaps none to consider at all, if free to revolve with the wheel.

In respect to bearings for the wheel spindle, these should be parallel, hardened and ground, mounted in pivoted split shells of cast iron, and, like the reducing gearing, inclosed in and exposed to the vapor of the wheel chamber. This may seem objectionable, because of heat, and it would be so in machines as now arranged, with the casing exposed to a high temperature. This latter I believe to be a mistake. No avoidable heat should be communicated to the casing to raise its temperature above that of the expanded steam. A low temperature would not cause appreciable thermal loss in the jet, but would assist a condenser and conduce to other desirable objects that have been named.

In respect to nozzles for buckets, such as have been suggested, it is a difficult subject without experiment and when the contour of a jet at different pressures is not known. I am of the opinion, however, that if inclosed the tube should conform to the natural contour of the jet. With side application of the steam or buckets flat or straight in one plane, there is no doubt a gain results from the use of a diverging nozzle,

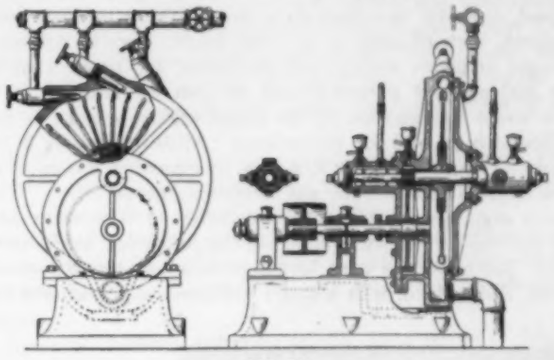


FIG. 13.

but in buckets in which the jet is divided the case is different. On the whole, I think it safe to assume that the form of nozzles for steam turbines of the single-acting type is not a problem that will much interfere with their successful construction. That there should be a converging anterior chamber, a throat to determine volume and a diverging nozzle is obvious, but further than this the result is no doubt a refinement that has more importance in a mathematical theorem than in the workshop. Some years ago, I think in 1901, I asked Mr. Brown, whom I have several times quoted, his opinion respecting steam-motor nozzles. He replied as follows:

> As regards the De Laval nozzles, the learned here are of various opinions as to their value. Professor Meyer, in Zurich, who has experimented long with the De Laval, says that it is in no way superior to a common nozzle.

The views and suggestions which I have had the privilege of advancing here have been imperfectly embodied in an organized mechanism, shown in Fig. 13. This drawing was made about two years ago, and it would be modified in various ways if reproduced.

I presume this presentation of a subject, without the scientific furtherance common at this day, can hardly be considered a conventional contribution to the art. It may not be so accepted, but I venture the prediction that the evolution of cheap steam turbines, adapted for general manufacture and use, will before long result from effort and experiment on the part of intelligent and experienced mechanics aided by scientific data. This assumption has some answer in the fact that, already mentioned, 75 years ago Mr. Avery, a country millwright in western New York, made successful reaction steam turbines, and applied a large number of them successfully to common rough uses. He also made impelling members which contained about one-tenth of the material now employed, and, as I believe, in a more practical manner than in many wheels now being produced. The work was done in blacksmith shops, at a time when accurate tools and processes were almost unknown, and I am much inclined to agree with the opinions of Prof. John E. Sweet, whose skill and judgment no one is likely to question, who, in a recent letter to the author, said: "If I were to engage in the manufacture of steam turbines I would begin with the Avery one."

The steam turbine practice of our day is the finest example

of constructive engineering work that the world has ever seen. It is confined to large units, not because of operative impediments in small engines, but because these cannot be furnished separately at such prices as can be obtained. From these premises I conclude that future steam turbines for common use will be single acting and condensing whenever possible, with wheels of sector construction as light as can be made. There will be no packing glands on the main spindles, and the first movers for transmission will be plain spur or tangent gearing.

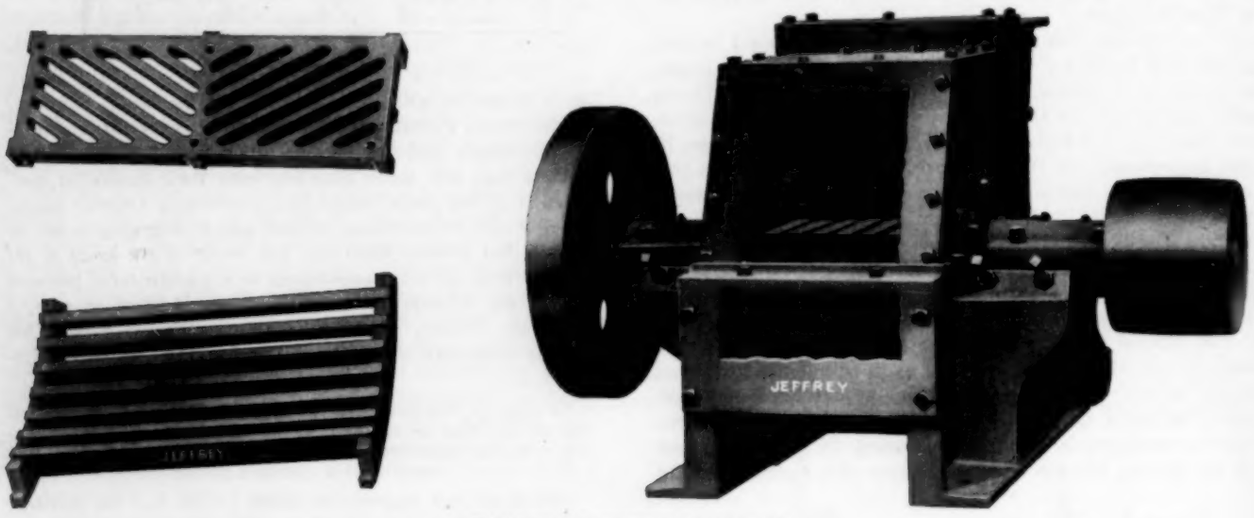
I will conclude this paper with brief mention of the economic results that have been reached with steam turbines, as illustrated by the generating engines recently constructed in Switzerland, one with very high-class piston engines and one with turbines, each of 5,000 h. p. The results were as follows: Weight of piston engines and generators, 598 tons. That of the turbines and generator only 78 tons, or nearly 8 to 1. The steam consumption by the piston engines was 11 lb. per indicated h. p., and for the turbines 1 kilowatt with 14 lb. of steam, or about 10 lb. per h. p. Oil consumption was as 20 to 1 in favor of the turbine, and attendance about 5 to 1. The piston engines were made by Sulzer Bros., of Winterthur, and the turbines by Brown, Bouveri & Co., of Baden, in Switzerland. The quantities were furnished to me by Mr. Brown, of Basel, Switzerland, with whom I had personally discussed the subject some time before the tests were made and who had forecast the result with much accuracy.

A HAMMER PULVERIZER.

The manufacture of this type of puverizer has recently been taken up by the Jeffrey Mfg. Co., of Columbus, O., being made under the Schoellhorn-Allbrecht patents acquired by it. The one illustration shows the pulverizer with its interior or crushing parts; the others show sectional screen frames which are special features in this machine. It is designed for crushing and pulverizing material such as coal, clay, shale and rock. Its features are its simple beater hammer, its V-shape bar screening surface, its simple adjustment of the beater arms to meet wear, its substantial adjustable dust-proof pillow blocks, its top feed hopper insuring large capacity and permitting material to be partly crushed while in suspension.

The accessibility of the inner parts is also a valuable advantage. The removal of the rear plate and the hand hole plates on the side of the machine make it possible to change the beater arms as well as the screening surface when this is necessary. The screening surface is made up in sections, so that it is the work of but a few moments to take out or change from one size of mesh to another.

The machine is made in many sizes to suit various requirements; for instance, in coal the capacity varies anywhere from 50 to 100 tons of coal per hour, depending entirely upon the degree of fineness. In pulverizing material such as rock the capacity is anywhere from 10 to 25 tons per hour. The Jeffrey Mfg. Co. make free crushing tests for interested parties.



HAMMER PULVERIZER AND SCREENS.

The Adrian Furnace Co. was organized Nov. 15 for the purpose of operating the Adrian furnace of the Rochester & Pittsburg Coal & Iron Co., Dubois, Pa., with the following directors: Adrian Iselin Jr., Arthur G. Yates, Lucius W. Robinson, B. M. Clark and Thomas W. Kennedy. The following officers were elected: Thomas W. Kennedy, president and general manager; Lucius W. Robinson, vice president; George H. Clune, treasurer; F. G. St. Clair, secretary and assistant treasurer; and J. G. Miller, general sales agent. The furnace has been shut down for a short period for relining and was put in blast Nov. 20.

The annual meeting of the Oriskany Malleable Iron Co., Oriskany, N. Y., resulted in the election of the following directors: E. B. Locke, J. B. Whitton, S. Nelson, W. W. Sink and George H. Graham. The directors elected the following officers: President, J. B. Whitton; vice president, S. Nelson; superintendent and treasurer, George H. Graham; inspectors, George H. Yoxall, James Goodwin, and J. A. Platt; auditor, F. W. Easton.

Three Westinghouse 62½-k. w. engine type generators in service in the New England building, Cleveland, were recently tested by a fire which completely burned away the insulation on the outside of the field coils. The fire department played upon these machines with six lines of hose for one hour. Within an hour from the time the water was turned off one machine was carrying its full rated load. The second machine was put in operation later and at present two of these machines are operating under the load normally carried by all three of them. The fireproof insulation of the field coils withstood the fire perfectly, even though the outer protecting coverings were entirely consumed and the heat was so intense as to burn and blister the finish on the frames.

Lewis A. Coleman has been appointed receiver of the Hussey Mower Co., Indianapolis, a corporation organized for the manufacture of reapers and other farm machinery, with offices in Indianapolis and extensive plants at Knightstown, Ind.

FOREIGN IRON AND STEEL NOTES.

The Scotch manufacturers of steel plates at a meeting early in November decided to take half a crown off the price of ship plates. It is stated in connection with this announcement that while American ship plates have been landed in the Clyde district the tonnage is not nearly so large as reported in some quarters. Now that the American steel trade has improved Scotch plate manufacturers feel that they have little to fear.

The *Kleines Journal*, of Berlin, announces that Herr Henting, the former premier of the duchy of Saxe-Coburg, Gotha, has been appointed manager of the Krupp works. This withdrawal from the premiership to enter trade is said to be without precedent in Germany.

A Nov. 10 report of the Cleveland iron trade, dated Middlesbrough, notes that a couple of inquiries were made for Cleveland iron for export to the United States next year.

The Glasgow *Herald*, in discussing at length the recent sharp advance in the price of Cleveland pig iron warrants, concludes that, all circumstances considered, it would seem that the rise in pig iron warrants has not been justified by any *bona fide* improvement in trade on this side. Moreover, the *Herald* adds, the pace has been too fast. The rise may have had the effect of scaring some of the more timid class of consumers into buying, but, with prices of the manufactured article on the present basis, and with little or no prospect of being able to obtain any advance, it is to be feared that users of pig iron can ill afford to pay more for it than they have done of late.

J. Buckton & Co., Ltd., of Leeds, England, are manufacturing a chain-testing machine with accumulator, for the locomotive department of the East Indian Railway.

The Farnley Iron Co., of Leeds, has been awarded a gold medal for its exhibit of "Best Yorkshire" iron, which was displayed in Group 118 in the Mines and Metallurgy building at the St. Louis Exposition.

G. W. Goode, Heath Grange, South Godstone, Surrey; H. L. Mitchell, 37 Gillingham street, London, S. W., and G. C. Oakley, Postern Heath, Tonbridge, Kent, have patented a bond suitable to bind ores and dusts of all kinds into a hard and solid substance. The following fully describes the process of manufacturing this brand: To 10 gallons of water add 7½ lb. glucose, 7½ lb. dextrine, 1¼ lb. tapioca flour, 5 lb. resin, 2 gallons of linseed or other oil. These are mixed and heated until the ingredients are combined. About 10 gallons of this mixture are required to bind one ton of ore or coal dust.

It is understood that the proportion of production in the new European steel rail pool is to be distributed as follows: England, 47 percent; Germany, 32; Belgium, 16; France, 5.

Paul Bloch, of Paris, who arrived in New York some time ago, is said to represent wealthy French capitalists who are stockholders in the General Steel Co., of France, which operates several large plants in the vicinity of Paris. Mr. Bloch is reported to be considering the advisability of reporting in favor of establishing a steel plant in this country.

The New England offices of the Allis-Chalmers Co. in Boston, and of its electrical department, the Bullock Electric Mfg. Co., will be consolidated on Dec. 1 and removed to the State Mutual building, 50 Congress street. George H. Berg will be the manager in charge of the consolidated offices.

The 30, 42 and 128-inch plate mills of the Carnegie Steel Co., Homestead, are closed down for repairs. The 48-inch mill in this plant has been idle for a short time undergoing repairs and will resume operations in a few days.

The machine shop of the Booth plant of the United Engineering & Foundry Co., Youngstown, O., is being extended 30 feet.

PERSONAL.

Willard N. Sawyer, who for several years has been connected with the Wellman-Seaver-Morgan Co., latterly as Pittsburg representative, and who was formerly superintendent of the open-hearth department of the Tennessee Coal, Iron & Railroad Co., has been appointed general manager of the Lake Superior Corporation at Sault Ste. Marie, Ont., to fill the vacancy caused by the death of Cornelius Shields.

Arthur L. Dickinson of the firm of Jones, Caesar, Dickinson, Wilmot & Co., public accountants, New York, Pittsburg and Chicago, has been elected president of the Federation of Societies of Public Accountants in the United States. Mr. Dickinson has an extensive acquaintance in iron and steel circles.

John A. Walker, vice president of the Joseph Dixon Crucible Co., has returned from a trip abroad, the sixteenth time he had crossed the ocean. He spent nearly three weeks in London, in a trade-mark suit, which was the occasion of the trip.

William Waddle, formerly paymaster of the Bellefonte Furnace Co., Bellefonte, Pa., has been elected secretary and treasurer of the Nittany Iron Co., of that city.

William Shoemaker, general superintendent of construction work for the Nova Scotia Steel Co.'s blast furnaces, North Sydney, B. C., has resigned. He will leave soon for Pennsylvania.

Louis M. Henoch, formerly general sales agent of Joseph T. Ryerson & Son, Chicago, has been made secretary of the company, succeeding C. M. Carr in this office, the latter being now vice president.

John Finnerty has been appointed superintendent of the Madison, Ind., mills of the American Car & Foundry Co. Mr. Finnerty was formerly superintendent of the Valley mills of the Republic Iron & Steel Co.

Lewis T. Brown, superintendent of the Upper and Lower union mills of the Carnegie Steel Co. in Pittsburg has tendered his resignation, to take effect the first of the year. He has been connected with the company for fully twenty-five years and several years ago was taken in as a partner. H. J. Schotter, superintendent of plate mills at Homestead, will succeed him. W. N. Beck, recently superintendent of the 48-in. plate mills at Homestead and transferred to Lorain, will be placed in charge of the Homestead Plate mills to succeed Mr. Schotter.

Obituary.

C. A. Parker, aged 45 years, second vice president of the Cincinnati, Hamilton & Dayton railroad, and vice president of the Pere Marquette road, died suddenly Nov. 16 in his office in Cincinnati. Mr. Parker went to Cincinnati last month from Denver, where he was vice president and traffic manager of the Colorado Fuel & Iron Co.

Jacob Mark, iron contractor and builder of New York, died Nov. 16 at his home in that city. He was born in Germany 70 years ago and came to this country in 1850. From a humble beginning he rose to prominence in building circles.

Work on the erection of three additional Talbot open-hearth furnaces is progressing favorably at the South Side plant of the Jones & Laughlin Steel Co., Pittsburg. These three furnaces will be of the same capacity as No. 1, and will be available in about four months. One of the furnaces will be ready to operate about Feb. 1, the work on the other two not being so far advanced. These four Talbot furnaces will have a daily capacity of 1,000 tons.

A conference between the Amalgamated Association officials and the Youngstown Iron Sheet & Tube Co., Youngstown, O., is being held this week to arrange a special scale for the skelp mill. The matter in dispute is in regard to the pay of the night rollers and heaters.

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NOVEMBER 24, 1904

THE END OF THE NEW YORK AGREEMENT.

The "New York Agreement," the pivot on which the relations of the National Founders' Association and the Iron Molders' Union have turned for five years, is no more. At its annual convention held in Cincinnati last week the National Founders' Association decided that the only course left it, in view of the experiences of the preceding year and the well understood attitude of the Iron Molders' Union, was to withdraw from an arrangement that had been used to defeat the very purpose that brought it into being. Conceived for the furtherance of peace the agreement had become a fruitful source of differences, first creating and then widening breaches between the two organizations.

As printed elsewhere in this issue the New York agreement readily appears to be a means of conciliation and peaceable adjustment of labor difficulties. By pledging the one party against strikes and the other party against lockouts, pending conference in which outside parties are represented, it aimed to prevent a sudden severance of relations between employer and employes and to give time for the sober second thought that prefers compromise to conflict. Such is the New York agreement in theory, and such it might be in practice, with a thorough understanding on both sides as to the nature of the questions subject to arbitration under it, and where a give-and-take attitude is maintained by the two organizations. But the expenditure of thousands of dollars and an aggregate of weeks of the time of busy men upon conferences has convinced the members of the National Founders' Association that the New York agreement, as made use of by the present leaders of the Iron Molders' Union, is not an efficient instrument of arbitration and has become unworkable and impossible.

The formal declaration to this effect adopted at Cincinnati is not to be considered as a change in the founders' attitude toward conciliation and arbitration. The men who assisted in making the New York agreement and who gave unreckoned days to patient, honest efforts to make its provisions count for peace and for some definite gain in the relations of workmen and employers, both in an organized capacity, freely acknowledged, though with deep regret, that the agreement no longer served the good purpose for which it was created. What may be considered the more strongly conservative element in the National Founders' Association, composed of men with more tolerance for unions than some of their associates who have no relations with organized labor, was a unit, after all the evidence was in, in deciding that further attempts to work under the agreement were futile.

The immediate result of the action taken at Cincinnati will not be so great a change in the relations of the two organizations as might seem likely, for the New York agreement has been inoperative in a number of cities for some months. Foundrymen discovered that it was so plainly the intent of the Iron Molders' Union to use the New York agreement to block any changes in shop conditions, that the foundrymen in various cities, finding that no new agreements with the union were possible on the expiration of those made in prosperous times, gave notice that the New York agreement was a dead letter so far as those cities were concerned. Not only was the agreement invoked to prevent any change in hours or wages, but it was the claim of the molders that provisions of their own constitution and unwritten practices of the union were a part of an existing order over which the New York agreement threw its protection, so that these must apply in a union shop, unless the molders agreed to a change. The agreement was thus used to prevent the operation of molding machines by any but union molders, to prevent an increase of output by piece work or premium system, to bolster limitation of output, to prevent the practical recognition of exceptions to the minimum wage rate, which in some local conferences representatives of the union had been willing to concede theoretically. Above all, the New York agreement proved inefficient because conference boards were always evenly divided between the two sides. There was no odd man, with the result that conference after conference ended in an absolute deadlock.

While there may be some dissent from the position of the National Founders' Association, in its "outline of policy," that only wages and hours are arbitrable questions, a study of the relations of the founders' and molders' organizations in the past five years is convincing of the irreconcilable standpoints from which the Iron Molders' Union and the foundry proprietor come to the questions affecting molders and their employers. There is in the contentions of the union the attempt, which employers must always resist, to control the instruments of production, to determine by decree what the amount of product shall be, to limit the opportunity of the American boy to learn the molder's trade, and to deprive of employment the workman who chooses not to put his destinies in the hands of labor leaders.

The efforts for a uniform agreement between molders and founders, extending over a period of four years, were steadily thwarted by one obstacle, though it assumed different forms—the practical insistence of the union upon control. That is the essence of unionism as exemplified in the present policy of the Iron Molders' Union—control of workers, control of tools, control of the factors that determine the kind and amount of output; in short, such control as leaves to the employer the functions of salesman and paymaster.

It is much to be regretted that the expectations entertained of the New York agreement have not been realized. The five years' intercourse under it between the two organizations have not been altogether unproductive, but the results have evidently not been at all comparable with the expenditure of time and talent and money. An educational process that proceeds so slowly might yield results in a generation or two, but the Iron Molders' Union, judged by its recent history, is rather disposed to move backward than forward. It clings to too many so-called "principles" of unionism from which modern industrialism is pulling away.

AMERICAN FOUNDRYMEN'S LEAGUE.

In connection with the convention of the National Founders' Association at Cincinnati last week some information came out concerning another organization of foundrymen which deals with labor questions, but on a somewhat different basis. It is the American Foundrymen's League, organized at Niagara Falls, N. Y., Aug. 4, 1904, at a meeting called by E. C. Stearns, of E. C. Stearns & Co., Syracuse, N. Y. Already it has a membership of more than 75 firms, a considerable number of which belong also to the National Founders' Association. The objects of the league are stated as follows:

1. To assist members in operating their foundries free from the dictation of labor unions.

2. To maintain a bureau of labor and information of molders and others employed in the foundry, for the benefit of its members and workmen.

3. To assist its members in the best and most economical methods of foundry management.

The following obligation is taken by those who join the league:

"We, the undersigned, being foundry operators, do hereby covenant and agree to and with each other, and every person composing the membership of this league, as follows:

"1. In consideration of fair dealing being a cardinal principle of this league, we pledge ourselves to assist any of our fellow members who may require our support against any unjust demands of labor organizations.

"2. We acknowledge a moral obligation upon us, in case we are notified by the secretary that any members are in trouble, to furnish them our quota of 5 percent of our molders, if required, the expense to be borne by the members calling for them.

"3. We bind ourselves to obey the constitution and by-laws, and all proper rules made in conformity with the same, provided they do not conflict with the laws of the country, state or province in which we we do business."

One of the by-laws provides that the league shall not recognize or make any agreements with any labor organizations. Any member having a strike in his shop within two months after applying for membership shall have no claim upon the league for assistance in such strike. Each member pays as annual dues 50 cents for each man employed at molding in his foundry.

The present officers of the American Foundrymen's League are: President, E. C. Stearns, E. C. Stearns & Co., Syracuse, N. Y.; vice president, Edward Gurney, Gurney Foundry Co., Toronto, Can.; treasurer, J. B. Jones, Utica Heater Co., Utica, N. Y.; secretary, Wm. Sleicher, West Side Foundry Co., Troy, N. Y. The charter membership is composed of the following:

Aird-Platt Mfg. Co., Watervliet, N. Y.; American Engineering & Foundry Co., Los Angeles, Cal.; American Hardware Corporation, New Britain, Conn.; Arcade Mfg. Co., Freeport, Ill.; Aultman Co., Canton, O.; Bagley-Sewall Co., Watertown, N. Y.; Barbour-Stockwell Co., Cambridgeport, Mass.; C. S. Bell Co., Hillsboro, O.; Bertram Engine Works Co., Toronto, Ont.; Bettendorf Metal Wheel Co., Davenport, Ia.; Builders' Iron Foundry, Providence, R. I.; W. P. Callahan & Co., Dayton, O.; Canada Foundry Co., Toronto, Ont.; A. Carpenter & Sons, Foundry Co., Providence, R. I.; Chambers Brothers Co., Philadelphia; Coleman Hardware Co., Chicago; Columbus Machine Co., Columbus, O.; Dean Brothers Steam Pump Works, Indianapolis, Ind.; John H. Dialogue & Son, Camden, N. J.; Diamond State Steel Co., Wilmington, Del.; Dominion Radiator Co., Toronto, Ont.; Easton Foundry & Machine Co., Easton, Pa.; Erie Foundry Co., Erie, Pa.; Exeter Machine Works, Pittston, Pa.; Fore River Ship & Engine Co., Quincy, Mass.; Frost & Wood Co., Ltd., Smiths Falls, Ont.; Germer Stove Co., Erie, Pa.; Giblin & Co., Utica, N. Y.; Gurney Foundry Co., Toronto, Ont.; Harman-Cogger Co., Bloomsburg, Pa.; Heebner & Sons, Lansdale, Pa.; Holyoke Machine Co., Holyoke, Mass.; J. H. Horne & Sons' Co., Lawrence, Mass.; Humphreys Mfg. Co., Mansfield, O.; A. L. Ide & Sons, Springfield, Ill.; International Heater Co., Utica, N. Y.; Jones of Binghamton, Binghamton, N. Y.; Kennedy Valve Mfg. Co., New York City; J. M. Kohler Sons' Company, Sheboygan, Wis.; Landers, Frary & Clark, New Britain, Conn.; Lane & Bodley Co., Cincinnati; Logan Mfg. Co., Phœnixville, Pa.; Mechanics' Iron Foundry, Boston; Moline Plow Co., Moline, Ill.; Moline Pump Co., Moline, Ill.; John B. Morris Foundry Co., Cincinnati; National Brass & Iron Works, Reading, Pa.; R. S. Newbold & Son Co., Norristown, Pa.; Ohio Cultivator Co., Bellevue, O.; Otis Steel Co., Ltd., Cleveland; Pacific Iron Works, Fremont-Seattle, Wash.; Peerless Mfg. Co., Louisville, Ky.; Pevey Brothers, Lowell, Mass.; Prescott, Co., Menominee, Mich.; Rockwood Mfg. Co., Indianapolis, Ind.; Rumsey & Co., Seneca Falls, N. Y.; Schill Brothers' Co., Crestline, O.; Scullin-Gallagher Iron & Steel Co., St. Louis; Simpson Iron Co., Columbus, O.; Stowell Mfg. & Foundry Co., S. Milwaukee, Wis.; E. C. Stearns & Co., Syracuse, N. Y.; Samuel C. Tatum Co., Cincinnati; Taylor-Forbes Co., Ltd., Guelph, Ont.; M. H. Treadwell & Co., Lebanon, Pa.; Utica Heater Co., Utica, N. Y.; Walker Foundry Co., Erie, Pa.; Western Foundry Co., Ltd., Wingham, Can.; West Side Foundry Co., Troy, N. Y.; R. D. Wood & Co., Philadelphia; Wrightsville Hardware Co., Wrightsville, Pa.

National Merchant Marine League.

What is known as the National Merchant Marine League was organized in Cleveland on the evening of Nov. 21 at a meeting attended by men prominently interested in marine and industrial progress. Aaron Vanderbilt, of New York, who for years has been a leader in the movement to upbuild the merchant marine, addressed the meeting, as did also Edward C. Plummer, of Bath, Me. Other speakers were President Brown, of the Brown Hoisting Machinery Co., Cleveland; A. S. Upson, President Craig, of the Craig Shipbuilding Co., Toledo; S. T. Wellman, S. W. Meek, W. D. Sayle, Andrew Squire and Col. J. J. Sullivan. After by-laws had been adopted, the following officers were elected: Harvey D. Goulder, president; Aaron Vanderbilt, vice president; J. A. Penton, secretary; Col. J. J. Sullivan, treasurer. The by-laws provide that the object of the league shall be the restoration to the high seas of the American flag, to the end that the interests of American commerce may be furthered and an industry whose importance as an aid to our national prosperity should be regarded as paramount may be restored. The membership is to be composed of persons, firms and corporations who believe that immediate action should be taken by congress and that the rebuilding of the American merchant marine should be regarded as a national and patriotic and not a partisan measure.

Twenty mills of the Shenango plant of the American Sheet & Tin Plate Co., New Castle, Pa., resumed operations this week, the remaining ten continuing idle. The Star plant of this company located at Pittsburg also resumed operations, as well as 16 mills of the Martins Ferry plant. Ten of the 20 tin plate mills at the Sharon, Pa., plant will resume shortly as well as 20 mills of the American plant in Indiana.

The Labor Situation.

MURDEROUS WORK AT CINCINNATI.

As a result of detective work done under the direction of the Cincinnati Employers' Association and the National Founders' Association, there have been some startling developments in connection with the strike of union molders which has been in progress in Cincinnati, Covington and Newport, Ky. Six men are under arrest and other arrests will probably follow. Three union workmen are charged with murder and three with malicious destruction of property. A warrant has also been issued for Joseph Valentine, president of the Iron Molders' Association of North America, but it was not served, as Mr. Valentine was in Cleveland. The strike has been in progress several months, as already reported in these columns, and during that time there have been numerous disturbances at different foundries in the three cities. On Oct. 7 Samuel Weakly, a non-union molder, was killed and Frank Brown narrowly escaped from strikers who assaulted him. This week attempts were made to blow up the Eureka foundry in Cincinnati, and also a foundry in Newport. Two of the men arrested, charged with malicious destruction of property, are Fred Rauhauser and son, and they have made confessions. According to the report of the confession of the Rauhauser boy, he alleged that an official of a local union urged him to place three dynamite cartridges in a mold at the Eureka foundry while the non-union men were at work. The son spoke to his father about the matter and says he was told to go ahead, but be careful. It is stated that in the confession he said he was given five dynamite cartridges at the headquarters of a local union. The attempt to dynamite the Newport Brass & Iron Foundry caused considerable damage to one of the buildings. The plant has been enclosed with a 12-ft. fence and the non-union men live within this stockade. Following the arrest of Thomas Bracken, a union molder at Detroit, for the murder on Oct. 7 of Samuel Weakly, detectives charge two plots against certain of the strikers; one for the murder of Weakly and the other for the poisoning of non-union men who were stopping at a boarding house. After the murder of Weakly, half a dozen detectives disguised as working men secured union cards and joined the strikers to gather evidence. The detectives claim to have evidence involving a number of union molders, not only in the plot to kill Weakly, but also in a general plot to poison non-union molders. It is claimed that another non-union molder was to have been killed the same night Weakly was killed. It is stated that five men had been assigned to kill Weakly and Brown and that three have left the State, but are under constant surveillance of detectives. It is alleged that the plot to poison non-union molders was to have gone into effect on the night of Nov. 23. One of the detectives who says he has been assigned to aid in the poisoning claims to have proof that the poison had been bought.

President Valentine, when interviewed in Cleveland Tuesday, emphatically denied that he had any knowledge of any kind of a plot and said that he had never seen a stick of dynamite in his life. He said he would promptly return to Cincinnati and face any charge against him.

Hatching of the Dynamite Plot.

(Special Telegram.)

CINCINNATI, Nov. 23.—The disclosures in connection with the molders' strike were much discussed at the dinner of the Cincinnati Employers' Association Tuesday evening. The confession of Rauhauser says the agreement with him was made in Valentine's office. The confession reads: "I was instructed in the use of dynamite by Joseph Hollowell. At the same time he told me to destroy the mold of the shear punch, Valentine agreeing to pay me $20 if I succeeded in destroying the shear punch."

Dynamite was placed in a 7-ton mold at Eureka Foundry. Valentine is charged with malicious destruction of property.

METAL TRADES ASSOCIATION NOTES.

The last issue of the National Metal Trades Association *Bulletin* will be of such character as to call special attention to it. When it appears under its new title, the *Open Shop*, one of the features will be a discussion of the article from the pen of Clarence S. Darrow which appeared in a recent edition of a leading Eastern publication.

The St. Louis Metal Trades Association will hold its annual meeting for the election of officers and for the transaction of other important business at its headquarters on Nov. 23. The secretary of this association calls attention to the fact that the meeting will be addressed by Mr. W. P. Eagan, commissioner of the N. M. T. A.

The regular monthly meeting of the New York Metal Trades Association will be held at its office on Dec. 8. Just previous to this there will be a meeting of the executive committee of the association. Mr. Hunter, the secretary of this association, announces that the labor bureau, recently established, is now in running order.

It is reported that John McNeale, grand president organizer of the Brotherhood of Boiler Makers and Iron Ship Builders, has been expelled from one of the local lodges of Chicago.

W. C. Gentry has been elected secretary of the Manufacturers' Association of Pittsburg. Mr. Gentry reports considerable difficulty in securing apprentices who are willing to take outside positions at apprentices' wages, and also that the Patternmakers' League of Pittsburg was reorganized a few days ago.

It is reported from Pittsburg that there is a movement on foot to consolidate the Iron Molders' Union, the International Association of Machinists, and the unions of structural workers, boilers makers, etc.

The Chicago Metal Trades Association is requesting its members to furnish its secretary with a written opinion on the advantage or disadvantage of the closed shop as against the open shop.

John Hibbard, president of the Chicago Metal Trades Association, will read a paper embodying the opinions of the members of his association on the open shop question, at the annual meeting of the American Economic Association which will be held in Pittsburg the latter part of December.

Judging from reports emanating from Chicago it would appear there is a decided falling off in the number of assaults growing out of the machinists' strike.

Many members of the National Founders' Association who attended the recent annual convention of the association in Cincinnati made their headquarters at the office of the National Metal Trades Association.

LABOR NOTES.

The lockout and strike of the union boiler makers and laborers on the Erie railroad at Susquehanna, Pa., still continues. The company is employing imported non-union help in the shops and the union men are taking jobs on other roads.

The contract system has been abolished at the Schenectady plant of the American Locomotive Co. Before the first of the year the entire force of 5,000 men will be engaged in the completion of the 35 electric locomotives for the New York Central's terminal service at New York and other contracts.

The molders and coremakers employed by the Christopher & Simpson Architectural Iron & Foundry Co., St. Louis, are on a strike because of the piecework system. All of the vacancies in the shop have been filled by the National Founders' Association.

The Light Inspection Car Co., Hagerstown, Ind., has received orders for a number of its velocipede cars from the Japanese government.

LAKE SUPERIOR IRON MINES.

The Killorin-Philbin Co., which is stripping the Monroe Tener property on the Mesabi range, is to keep at work all winter if conditions are such as to permit it. There is a great deal of stripping to be taken off the mine and it rests with the contractors whether there can be any shipments the coming year. It is said the Steel Corporation's mine interest has requested the contractors on this and other works to push matters, for they propose to mine more heavily than was expected and more heavily than in the past. This includes not only the Monroe but the Fayal, the Morris, which has been idle this year, and some other operations. A good deal of additional stripping is liable to be ordered this winter, for outside companies, as it has come to be recognized that far more stripping is practicable than was formerly thought possible.

Stripping has been pushed with redoubled vigor at the Burt mine, Hibbing, Mesabi range, and the shipments are to continue longer than thought probable, on account of the warm and pleasant weather. This is true of all properties along the lakes.

A new shaft house is to be erected at the Blue mine, Negaunee. Mitchell & Sherman have been given the contract for a concrete foundation, which will contain 1,000 cubic yards of material. The overhead structure will not be completed until some time during the winter, as it is impossible to do all of it till navigation ceases.

Very little work has been done at the Pettit mine for some time and it is not probable they will ship any more ore this season.

The Miller mine commenced a small trial shipment the past few days, it being the first ore to go forward. The mine has been under development in a way for over a year. It is the most easterly mine to ship on the Mesabi range, and is nearly as far east as the Stephens, which has been equipped on a large scale for open pit work but has never put out any ore. Only about 1,000 tons of Miller ore have been shipped and nothing more will be sent out this year. The Pitt Iron Mining Co. operates the property.

No. 3 pit of Fayal, which has been closed down for the greater part of the year, and was abandoned as open pit work, has been reopened and one steam shovel is expected to load there as long as it is possible to get out ore without danger of its freezing in cars or dock pockets. The mining and railway companies are determined not to permit ore to freeze this fall if they can avoid it. Fayal's season, which had closed, will remain open if possible till Dec. 15, and the mine's shipments will reach 1,000,000 tons.

A Duluth, Minn., contracting firm has taken the contract for extending No. 3 dock of the Duluth, Missabe & Northern road at that place. It will cost about $300,000 and will add 40,000 tons to the company's ore storage capacity. The dock will be wider and higher than either 1 or 2, and will be completed by the opening of navigation. The Duluth & Iron Range road's contract for extending docks has not been let.

The Great Western mine, at Crystal Falls, is being unwatered and will be in readiness for renewed underground work in a short time. It is a fair sized property for that region and contains an ore that is desirable. The work of keeping water out is to be done by a blower, to be stationed in the edge of the open pit and will be kept there permanently, for it is thought that most of the water in the mine has come from surface and it is proposed now to keep it from running down.

About 60 men are stripping at Jordan mine, and are carrying the work forward in a new and unique manner, dumping the stripped earth into the pit, milling it to pockets over drifts, running it to shaft and hoisting to surface. The entire ore body will be stripped for next season's operations.

At the Shenango mine, Mesabi range, they are stock piling for next year and propose to mine extensively all winter. This mine has not been actively operated in any previous season, and in fact has not been developed until now.

Inspector W. E. H. Carter, of the Canadian Bureau of Mines, who has returned from an investigation of working mines, states that in the lower elevations of the Williams iron mines, on the Algoma Central railway, north of the Soo, new bodies of high grade hematite ore have been struck. These show a total of 23 ft. of clean ore, with an additional 10 ft. of second grade ore, in a total width of 60 ft. This is an entirely new iron area, and, if the bodies prove to be continuous, may develop into an important field. North of Temagami there are two promising prospects—one for iron pyrites and the other for arsenical pyrites.

Associated Foundry Foremen of Philadelphia.

The second meeting of the Associated Foundry Foremen of Philadelphia and vicinity was held at the Manufacturers' Club Nov 16. The following officers were elected: President, A. T. William, of Enterprise Mfg. Co., Philadelphia; vice president, James B. Strain, of Robert Wetherill & Co., Chester, Pa.; treasurer, George M. Benkert, of Williamson Bros. Co., Philadelphia; secretary, W. P. Cunningham, of American Bridge Co., Pencoyd, Pa. Trustees: W. O. Steele, of Bateman Mfg. Co., Grenloch, N. J., for one year; H. W. Kramer, of Thos. Devlin Mfg. Co., Philadelphia; for 18 months; Adam Pugh, of I. A. Sheppard & Co., Philadelphia, two years.

A resolution was introduced changing the by-laws to make three grades of membership, active, associate and honorary. The next regular monthly meeting will be held at the Manufacturers' Club on Wednesday evening, Dec. 21, 1904.

Increasing Pig Iron Production.

(Special Telegram.)

PITTSBURG, Nov. 22.—Orders have been issued by the Carnegie Steel Co. to blow in the new blast furnace No. 2 at New Castle. The old stack on the site where the new furnace stands was dismantled last year. It was known as Neshannock furnace. The new stack is 94½ by 20 ft. and is equipped with four McClure stoves, each 85 x 21 ft. The annual capacity of the furnace is 160,000 tons. The New Castle plant has now four modern furnaces with an annual output of 630,000 tons. Furnace No. 3 of this group has also been rebuilt and was blown in some time ago. With the firing of stack No. 3 at Sharon the Carnegie Steel Co. will have seven modern stacks in operation in the Shenango valley.

Full Tin Plate Capacity.

(Special Telegram.)

PITTSBURG, Nov. 23.—Orders have been issued for the early resumption of the Humbert and New Kensington plants of the American Sheet & Tin Plate Co. With the starting of these tin mills practically all of the 249 mills of this company will be in operation. Heavy contracts have been closed in the last ten days with the American Can Co. and large packing interests.

The eleventh annual convention of the National Association of Implement and Vehicle Manufacturers was held at Chattanooga, Tenn., last week. President F. E. Myers, of Ashland, O., presided. About 500 delegates and visitors were in attendance, representing vehicle and implement manufacturers of all parts of the United States. The following officers were elected: President, W. W. Collier, Detroit; chairman executive committee, C. F. Huhlein, Louisville; treasurer, H. K. Walcott, Batavia, Ill. The vice presidents include J. M. Studebaker, South Bend, Ind.; B. T. Skinner, Battle Creek, Mich.; L. D. Collins, Batavia, N. Y.; Fred Bateman, Grenloch, N. J.; and F. B. B. Niess, Canton, O. The meeting next year will be held at Niagara Falls

Cincinnati Convention of the National Founders' Association—A New Policy Adopted.

The Cincinnati meeting of the National Founders' Association last week marked the beginning of a new era in the history of that organization. It is significant that a cycle of seven years was run before the new departure was made, and a noteworthy coincidence that last week's meeting was held in the same room in the Grand Hotel in which seven years before the National Founders' Association was organized.

To put the story in few words, the Cincinnati meeting formally announced the withdrawal of the National Founders' Association from the famous "New York agreement" with the Iron Molders' Union. But it should be said in this, the very next sentence, that in practically the same breath the association declared its continued belief in the principle of arbitration and its disapproval of strikes and lockouts. To give practical effect to this expression the officers and administrative council were instructed to favor arbitration with employes either singly or collectively on subjects other than those which the association considers indisputable. In other words, the association declares for the arbitration of questions of hours and wages.

In view of its conspicuous position among employers' organizations this action of the National Founders' Association becomes of prime importance at a time when collective bargaining is brought so prominently to the front as a feature of the modern industrial system. To have a clear understanding of the meaning of the step just taken, it is well at the outset to recall what the New York agreement is. It was adopted at a conference held in 1899 at New York by representatives of the two organizations, the agreement being afterward ratified on both sides. It is as follows:

NEW YORK AGREEMENT.

Whereas, The experience of the members of the National Founders' Association and the Iron Molders' Union of North America justifies them in the opinion that any arrangement entered into that will conduce to the greater harmony of their relation as employers and employes, will be to their mutual advantage; therefore, be it

Resolved, That this committee of conference endorse the principle of arbitration in the settlement of trade disputes, and recommend the same for adoption by the members of the National Founders' Association and the Iron Molders' Union of North America, on the following lines:

That in the event of a dispute arising between members of the respective organizations, a reasonable effort shall be made by the parties directly at interest to effect a satisfactory adjustment of the difficulty; failing to do which, either party shall have the right to ask its reference to a committee of arbitration which shall consist of the presidents of the National Founders' Association and the Iron Molders' Union of North America, or their representatives and two other representatives from each association appointed by the respective presidents.

The finding of this committee of arbitration, by a majority vote, shall be considered final in so far as the future action of the respective organizations is concerned.

Pending adjudication by the committee on arbitration there shall be no cessation of work at the instance of either party to the dispute.

The committee of arbitration shall meet within two weeks after reference of the dispute to them.

The New Policy Stated.

Before passing to our detailed report of the Cincinnati meeting we give below the text of the important declaration it adopted, embodying the reasons for withdrawing from the New York agreement and outlining the policy to be followed by the members of the N. F. A.:

Policy of the National Founders' Association, outlined by the Convention of 1904.

The National Founders' Association, having exhausted every effort during the period of its existence to formulate a uniform agreement with the molders employed in the foundries embraced in its membership, which foundries are accustomed to make agreements with the molders, hereby makes formal announcement to its members of a policy which they are now requested to pursue in the conduct of their foundries, said policy being intended to put into practice equitable conditions, the principal features of which are as follows:

LIMITATION OF OUTPUT.

Arbitrary limitations of output on the part of the molders, or arbitary demands for an excessive amount of output by the molders on the part of the foundrymen, being contrary to the spirit of equity which should govern the relationship of employer and employe, all attempts in that direction by either party, the molder or foundryman, are to be viewed with disfavor and will not receive the sanction of this association.

LIMITATION OF EARNING CAPACITY.

Inasmuch as certain practices insisted upon by labor organizations tend toward counteracting the energy, ability, inclination and opportunity of molders to earn greater compensation than they are now receiving, it shall continue to be the policy of this association not to permit the limitation of a man's earning capacity, whether he is working by the day, by the piece or premium system, thus protecting our workmen in a desire to improve their conditions.

FINES AND RESTRICTIONS.

Believing the action of labor organizations in inflicting upon their members fines and punishments for accepting opportunities of advancement and increased earnings offered by the foundrymen is a practice tending toward a deterioration of the ability of the individual workman, this association hereby reaffirms its determination to prevent the imposition of fines and restrictions placed on a molder for the purpose of handicapping him or retarding him in any way from putting forth his best efforts to produce the best quality and quantity of work in the shortest time and receiving a proportionate compensation.

METHOD OF EMPLOYMENT.

Employes will be paid by the hourly rate, by premium system, piece work or contract, as the employers may elect, and the workman so employed will be required to give a fair day's work for a fair day's pay.

RELATIONS OF EMPLOYES.

Every workman who elects to work in the foundry of a member of this association will be required to work peaceably and harmoniously with his fellow employes and to such a workman the freedom of employment shall not be denied.

FREEDOM OF EMPLOYMENT.

It is the privilege of the employe to leave our employ whenever he sees fit, and it is the privilege of the employer to discharge any workman when he sees fit.

APPRENTICES.

The number of apprentices, helpers and handy men to be employed will be determined solely by the requirements of the employer.

APPLIANCES.

It shall be the right of the foundryman to introduce molding machines and appliances of any kind and to have the same operated by whomsoever he finds to his best advantage to employ thereon.

STRIKES AND LOCKOUTS.

Disapproving absolutely of strikes and lockouts, the members of this association will not arbitrate any question with men on a strike. Neither will this association countenance a lockout on any abitrable question unless arbitration has failed

ARBITRATION.

The above principles being absolutely essential to the successful conduct of our business, they are not subject to arbitration.

In case of disagreement concerning matters not covered by the foregoing announcement, we advise our members to meet their employes either individually or collectively and endeavor to adjust the difficulty on a fair and equitable basis.

METHOD OF ARBITRATION.

In case of inability to reach a satisfactory adjustment we recommend that the question be submitted to a board of arbi-

tration consisting of two of the employes and two persons engaged in the management of the firm or corporation involved and in case they fail to reach a satisfactory agreement within seven working days, a fifth member shall be chosen by these four and the majority report of the board so constituted shall be final and binding.

In order to receive the benefits of arbitration the employe or employes must continue in the service and under the orders of the employer pending a conference and decision.

In case any member refuses to comply with this recommendation within thirty days after the dispute arises, he shall be denied the support of this association unless it shall approve the action of said member.

WAGES.

Employers shall be free to employ foundry operatives at such wages as may be mutually agreed upon, said rates to be governed by local or shop conditions.

In the operation of piece work, premium plan or contract system now in force or to be extended or established in the future, this association will not countenance any conditions of wages which are not just or which will not allow a workman of average efficiency to earn at least a fair wage.

Arbitration Resolution.

In connection with the adoption of the above outline of policy the convention reaffirmed its adherence to the broad principle of arbitration between employer and employe in these terms:

WHEREAS, It has become necessary to withdraw from the provisions of the New York agreement for the reasons announced in the declaration adopted by this convention, and

WHEREAS, The outline of policy adopted by this convention provides means for the settlement of differences which may arise between our members and their employes upon subjects other than those which we believe to be and have announced as indisputable, be it

Resolved, That we hereby announce our continued belief in the principle of arbitration and our disapproval of strikes and lockouts and instruct our officers and administrative council to favor arbitration with our employes either singly or collectively whenever and wherever it will enable them to establish and maintain just and equitable relations between our members and their employes.

WEDNESDAY MORNING.

The reports of President I. W. Frank and Commissioner O. P. Briggs prepared the minds of the members present for the proposals that came later. On the day preceding, President Frank had discussed his report with the members of the administrative council and on Tuesday evening at a dinner of the "alumni"—the ex-officers and ex-members of the administrative council—attended also by the present officers and members of the council, the New York agreement and the policy the association should now adopt respecting it were thoroughly gone over, with the result that the 24 persons present, including all ex-presidents, except two who could not attend, were unanimous in the conclusion that that agreement had become an unworkable and impossible one.

President Frank, as was indicated in the brief synopsis of his report presented in our last issue, gave a resume of the developments of the past year as they affected the relations of the association's members with the Iron Molders' Union. The slack trade of the year and the trials it had brought had not been without compensations, for they had brought home some of the neglects of foundrymen in the stress of prosperous times. Practices had crept into their works which needed to be corrected. The year had given the opportunity for considering these. There had been little or no change in wages as the result of the falling off in business, but the Iron Molders' Union had not been so generous as to see that the employer got a full day's labor for the wage he paid. Some members had waked up to the fact that in many cases they were getting a half day's work for a full day's pay. There had been on the part of the founder neglect of the molding machine, neglect of apprentices, the number of whom had been restricted because of the employer's failure to provide for the maintenance of a sufficient number of skilled men, as well as by the limitations of the union. It had seemed that the lull of the past year was an opportune time to correct some of the abuses which had been suffered in years past and in doing this they had run counter to a force. The Iron Molders' Union was unwilling to abate these abuses, and disagreements had arisen which had in some cases brought on strikes. Some of the members had had the courage to institute in their shops the free conditions that should prevail in every foundry in the United States, and in their stand they were backed by the entire association.

President Frank then referred at some length to the flagrant abuse of the New York agreement, closing this portion of his report by announcing that the administrative council was unanimous in recommending its abrogation. Extracts from other portions of the report are given below:

"The hope was expressed by your committee on national agreement at the last convention of the association and was entertained by the officers when they called for a conference of the Iron Molder's Union for April 7 last, to discuss this matter, that a uniform national agreement might be made, which would express some of the inherent rights of the manufacturer. The meeting convened and was attended by five members representing the National Founders' Association and five executive officers, accompanied by about 30 business agents, of the Iron Molders' Union. You have learned through the *Review* that no definite conclusion was reached, that the meeting adjourned without accomplishing its purpose or even a semblance of its purpose. Your committee found that to every proposition presented by it there was an absolute opposition by the union, the claim being that we were endeavoring to make infractions on their organic law. This may be true, if their organic law includes both their written and traditional law, and the tradition is where most of the difficulty arises. It is by word of mouth that the molder is instructed to perform as little work for as much pay as is possible; also that he may not allow a non-union man to work in the sameshop, if the union men are sufficiently strong to prevent it; also to oppose the introduction of piece work on the premium system or any other system that will not enable the molder or coremaker to do as little work for as much pay as possible. The report of the committee with its recommendations has met with the unanimous approval of your administrative council and is submitted at this meeting for your action. * * * *

"The molding machine was frowned upon by the union when it was first installed; they are now seeking to have the union molder operate it, much against the wish of the manufacturer, who contends that the molding machine should and must be operated by whoever can give the best output for the least money. * * *

"For some time has the Iron Molders' Union pursued the diplomatic policy of making secret contracts with individual members and non-members of the N. F. A., the underlying purpose being to satisfy such firms or corporations as might be strong enough to be troublesome, and at the same time endeavoring to alienate such from the N. F. A. by showing them it is more profitable out than in the N. F. A. If they can succeed, through such arrangements, in weakening the National Founders' Association and causing its final dissolution, it will be a banner day for the Iron Molders' Union; and the special few, who through infidelity or selfishness had helped to bring this about, are likely to suffer with the rest. I warn you against secret contracts or alliances with the Iron Molders' Union or the individual molders. If a contract will not bear the light of day, it is an iniquitous one and should not be made. They are always of less advantage to the maker than the standard form which the union denies to our association but offers in a modified form to suit the special cases of individuals. This association should put itself clearly on record against all contracts unless they are disclosed and contain the provisions of the outlined policy. * * * *

"One of the proposed provisions of the standard form of

agreement was the establishment of a standard or basic wage rate, subject to differentials. I believe this to be one of the most important provisions of our association, and advise that our association, and advise that such a basic hour rate be established. I advocate the equity of all members paying the same graded hour rate for the average floor molder, coremaker and bench worker, which rate will apply to such men regardless of the hours worked. Any members who have given thought to the inconsistency of advocating in one locality a different hour rate from that in another must have concluded that our association is without a policy in that particular. This country is small enough to make each founder producing a similar grade of work a competitor, whether he be located in hamlet, town or city, and therefore in equity should pay the same rate in his class. The contention of the unions that the city should pay them a higher rate when meeting in conference with founders in the city, and the reverse when meeting founders in the country is no less inconsistent, and is only used for 'jacking up' purposes. The employer, however, who expects this association to maintain a lower rate in one locality to the detriment of another is equally inconsistent, but that is exactly what we have been doing.

"I certainly advocate the establishment of a rate that is equitable for all localities, taking into consideration what is now being paid, and that an average of all of them be taken and established, and would advocate the endorsement by this convention of such a policy, also, that a recommendation be made to the new administrative council to establish such a rate either with or without the consent of the Iron Molders' Union, and to pledge the association to its support."

Commissioner's Report.

The report of Commissioner O. P. Briggs analyzed the labor situation as affecting the association's membership. The strikes of the year were gone over with their causes and present status where still in progress. Referring to the conditions confronting the association at the close of the last fiscal year the commissioner summarized the auspices under which the year's work had been carried on, in substance as follows:

The union had its representatives in every town and hamlet where there were molders in sufficient numbers to form a branch, and they were ready to act immediately and forcefully upon the slightest provocation. By virtue of the New York agreement the National Founders' Association was in honor bound to treat with this labor union upon the most trivial matters as well as upon those of greater magnitude.

From the inception of this association until just prior to its last annual convention the union had been managed by men who might well be counted as conservative and reasonable. About that time their management was completely changed and a more radical element came into authority.

In November, 1903, the era of boom times and advancing wages was then practically at an end and many of the members felt that the time had arrived when they should at least make the attempt to reacquire such freedom from unjust unionism as was their right as employers of labor in a free country.

The four years' effort at attempting a national agreement, uniform in character, applicable to the machinery and jobbing interests of the association, had failed, and we found ourselves with that most miscellaneous lot of agreements on our hands so well known to all.

The only agreement of a national character between the members of the N. F. A. and the molders' union at this time was the so-called New York agreement. Great differences of opinion existed as to the wisdom of continuing this agreement, due to the fact that it had been disregarded to such an extent that many members felt that instead of its being the peacemaker it was intended to be it had become a trouble-maker of no small proportions.

There was an apparent necessity for a more complete working force, especially for field work, and a modification of the system of employing molders in supporting members in times of strikes.

Commissioner Briggs referred particularly to two problems which the administration had had to deal with in the past year. One of these was to complete and round out the official organization so as to have a force sufficient to render competent service to the membership in all emergencies that might arise. The other problem was that of clearly defining a policy in respect to shop management and all other labor questions and having the association work steadily toward it. Important progress had been made on both lines.

The commissioner referred to the fact that the joint conference of representatives of the Iron Molders' Union and the N. F. A. at the close of a four days and four nights' session found that no agreement could be reached on a single point. The union officials stubbornly opposed the proposals of the foundrymen and held out unconditionally for every feature of their antiquated constitution and by-laws. At the close of this conference, a meeting of the administrative council was held and the conclusion was reached that the N. F. A. having devoted four years of unceasing effort to meet the union on common ground and having utterly failed in all its attempts, should now declare its platform in positive terms and should formulate such a policy as would appeal to any fair-minded man, meantime resisting local agreements of every nature except such as were in line with the policy enunciated by the association.

The striking feature of all the conferences held with the union by virtue of the New York agreement was the persistence with which the union used the dead-locking feature of this agreement to prevent the slightest progress of the proprietors toward the introduction of any change in wage rate or new conditions or improvements. Having thus prevented agreement in any locality, the union would then strike the shops at the first appearance of the slightest change. The conciliation process provided for in the New York agreement seemed thus to have been entirely disregarded in the deliberations of the molder.

In the various strikes of the year which were gone over with some detail by the commissioner, it was reported that a new feature had been introduced in the defense of members. The association had employed a certain number of men on annual contracts and had developed a policy of always maintaining a strong force of competent workmen for the assistance of its members. For the training of men to be added to this number an efficient foundry superintendent had been secured.

In making acknowledgments to the members for the cooperation they had given in the year, the commissioner said that whatever success had been attained the assistance of those who had been associated with him in the office of the association had contributed greatly to it.

WEDNESDAY AFTERNOON.

The legislative work of the convention began on Wednesday afternoon, the various items of business coming up under the direction of the committee on resolutions, consisting of Henry A. Carpenter, of Providence; H. W. Wendt, of Buffalo; and Geo. Q. Thornton, of St. Louis.

Uniform Agreement.

The report of the committee on uniform agreement was presented by its chairman, Antonio C. Pessano. He called attention to the change that had taken place in the year in the personnel and management of the Iron Molders' Union, the men now in control being not as conciliatory as their predecessors. The present policy of the union was deeply regretted by members of the association who had long striven to preserve a conference relation with that organization. Referring to the Detroit conference in April, 1904, with representatives of the union the report stated that the committee

was convinced that it was impossible to secure a uniform agreement embodying equitable conditions. The experience of the past year had made clear the motives of the present officers of the Iron Molders' Union and it was evident that the association could make no fair agreement that would be honorably and equitably carried out.

The recommendation of the committee was that each member make individual agreements with his employes and that the provisions of such agreements be uniform in the shops of members. It was recommended also that such a form of agreement be drawn up and after being approved by the administrative council at its next meeting be submitted to the members and on their ratification it become the standard form for such agreements.

In the discussion of the report the question was asked, how such an agreement would apply to union shops and it was replied that in such shops no agreement would be entered into. It was added that the individual agreement is now employed in a number of cases, notably at Moline, Ill.

New York Agreement.

A question which had aroused general expectancy concerning the Cincinnati convention was that of the attitude of the association toward the New York agreement. There had been a failure to make new agreements with the Iron Molders' Union in a number of cities in the preceding year and in all such cities notice had been given by the foundrymen that the New York agreement was no longer operative there. As foreshadowed in President Frank's address before the Judiciary Committee of the House of Representatives at Washington last February, in view of the control of the Iron Molders' Union by the radical element in it, it looked as though the parting of the ways was very near. And this was the feeling which many of the members brought to Cincinnati.

O. P. Letchworth, under whose presidency the New York agreement was entered into, presented the resolution of withdrawal from it. He recited the conditions which led to the conclusion that such a step was inevitable and showed how the sentiment in the association that at one time strongly adhered to the continuance of the agreement, was now firm in the belief that the new policy proposed was all that was left to the association.

In the discussion following Mr. Letchworth's reading of the resolution it was pointed out that the New York agreement instead of decreasing disputes had actually increased them, had really provided an avenue for making trouble. One member argued that if there were a uniform agreement the New York agreement might be workable, but the molders were making use of the latter to make a uniform agreement impossible. It was stated that the molders had used the New York agreement to bolster up antiquated practices and to prevent progress. It was further considered to be an unfit medium of arbitration in that it made no provision for an odd arbitrator.

As adopted with but one dissenting vote, the resolution withdrawing from the New York agreement is as follows:

The National Founders' Association in convention assembled hereby declares:

1. That the New York agreement, which provides for the settlement of disputes by arbitration, pending which there shall be no strikes or lockouts depends for its successful enforcement upon the gradual elimination of causes for dispute.

2. That every effort of this association has been made to provide a contract between employers and employes which should recognize the rights and duties of the one to the other and such efforts have failed. Therefore be it

Resolved, that the administrative council be instructed to advise the officers of the Iron Molders' Union that we are compelled to withdraw from that agreement.

Basic Hourly Wage Rate.

A resolution was adopted referring to the new administrative council the portion of President Frank's report dealing with a basic hourly wage rate.

W. D. Sayle took the floor in the latter part of Wednesday afternoon to present an outline of policy to be followed by the association in view of the abrogation of the New York agreement. The details of the new statement of policy were under discussion at the hour of adjournment.

WEDNESDAY EVENING.

The annual dinner of the association was given on Wednesday evening in the Grand Hotel and was attended by about 150 members and guests. These dinners have become famous for their flow of sentiment and good fellowship and are much anticipated events. An elaborate menu was discussed, as detailed on a card of unique design. The speaking program was presided over by J. H. Webster, of Cleveland, who was eloquent and apt in presenting the various speakers. He first introduced W. D. Sayle, of Cleveland, who evoked the utmost enthusiasm by his characterization of the work of President Frank and his tribute to Isaac W. Frank, the man. It was evident by the demonstration attending his remarks that the National Founders' Association has something more than a basis of selfish business interest. The attachments that have grown up between its members and especially between those who have been leaders in the work are certainly more than the usual in such organizations. Mr. Sayle concluded by presenting to Mr. Frank a chime hall clock, which had previously been set up in his home in Pittsburg, and the receipt of which was gracefully acknowledged in a telegram from Mrs. Frank which the speaker read. The photograph of the clock was handed to Mr. Frank and with it a diamond ring. The scene that attended the response of the president was dramatic and touching—one, it is safe to say, that has not been equaled on any similar occasion. Mr. Sayle's address of presentation made such an impression that a resolution was adopted in the convention the next day directing that it be spread upon the minutes and that it be published also in the association's *Review* so that all members not present might have the benefit of it.

Other speakers were Hon. George E. Littlefield, of Providence, R. I.; Rev. Dr. Shutter, of Minneapolis, and F. B. Farnsworth, of the McLagon Foundry Co., New Haven, Conn.

THURSDAY MORNING.

The final report of the committee on outline of policy was the first order of business at Thursday morning's session. No new amendments were offered, the work of the committee over night having resulted in a clear-cut expression on all the points on which any difference of opinion as to form of statement existed at the close of the Wednesday afternoon session. As adopted, the report of the committee was in the form given in the early portion of this article.

Following the unanimous adoption of the outline of policy a resolution heartily endorsing the action of the administrative council in the various matters that had come up in the past year, and the policy followed by the association's officers in dealing with the Iron Molders' Union, was adopted. A hearty second to this resolution came from the Utica, Cincinnati and St. Louis members present, who testified to the excellent support they had received from the administration in the handling of their various strikes.

On a question of privilege a member took the floor to read the headlines of an article appearing in one of the morning Cincinnati papers. "Foundrymen Say Death to Unions" was the sensational and utterly false title of an article purporting to give an account of the previous day's proceedings. The member who called attention to it wanted it understood that whenever such a platform was adopted by the N. F. A. he must be counted out as a member, and this declaration was

seconded by members in various parts of the hall. He added, however, that he knew that no such position was taken by the N. F. A., and characterized the newspaper statement as utterly untrue and baseless. "What we are opposed to," said he, "is the unlawful and un-American methods adopted by some labor unions in carrying out their purposes."

Declaration for Arbitration.

A resolution reiterating the adherence of the association to tahe policy of arbitration was presented by Wm. H. Pfahler, as given above, in connection with the outline of policy, and it was unanimously adopted. The speaker recalled the meeting held seven years ago in the same hall in which the convention then sat. It was the meeting at which the N. F. A. was really organized, and there were in that meeting 34 members, while 80 other foundrymen listened to the statement of the purposes and plans of the organization. The speaker said that what struck him in the attitude of the foundrymen present seven years ago was that they did not trust each other. He believed that today the relation of confidence had been established and that now the members did trust each other, man to man. He referred to the change in the policy of the association which was made in the action taken withdrawing from the New York agreement. He counseled that the same attitude of conciliation should always be maintained that the association had stood for in former years. If the Iron Molders' Union had taken a wrong stand in the policy adopted by its officers of the past year, time would demonstrate the great mistake that organization had made. He urged that the members present should consider not only their own feelings and attitude, but that they should represent the unspoken majority, the absent membership. He added that in the future, as in the past, peace must be the dominant note of the organization if it would prosper in its plans—a sentiment that was warmly applauded.

A report was presented from the special committee on finance, consisting of G. E. Emmons, Walter Laidlaw and C. Bermingham. This showed that the financial status of the association had been greatly strengthened in the past year, and on the recommendation of the committee action was taken increasing still further the large reserve fund that had been accumulated.

Association Molders.

A resolution was adopted endorsing the practice of employing a corps of association molders and core makers, as well as instructors for such workmen, and that this policy be extended in the coming year.

The publication of the *Review,* a monthly news letter sent out from the headquarters of the association, was ordered continued. The matter of disseminating literature among workmen also came up and was referred to the administrative council for such action as was deemed best. Several members spoke of the excellent results obtained from wise publicity. A St. Louis member cited the work of the Citizens' Industrial Association of St. Louis, which publishes the *Citizen's Industrial Exponent.* Information as to the merits of disputed questions between unions and employers was given in this publication, which properly characterized the unlawful methods resorted to in strikes and boycotts.

A letter was read from J. A. Holmes, chief of the mines and metallurgy department at the St. Louis Exposition, inviting the members to visit the Exposition on Friday, Saturday and Sunday. Quite a number expressed their intention of accepting the invitation, and later a committee of the St. Louis members announced that a special car had been secured which would leave Cincinnati Thursday night.

American Foundrymen's League.

E. C. Stearns, of Syracuse, N. Y., president of the American Foundrymen's League, was given the floor to speak of the work of that organization. Its membership and methods are referred to more at length in another portion of this issue. Mr. Stearns said that the association was in no sense antagonistic to the N. F. A., though its members were in all cases operators of non-union shops.

THURSDAY AFTERNOON.

A resolution was adopted permitting the administrative council to elect as honorary members persons who as active members had rendered valuable service to the association but who afterward had withdrawn from the foundry business.

A paper was read by Geo. Q. Thornton, of St. Louis, proposing a working foundry maintained by the association as a school for the training of foundry foremen. It is printed in full elsewhere in this issue. Following the reading a resolution was adopted calling for the appointment of a committee of three by the incoming administrative council to consider the matter of a school for foundry foremen and report to the council.

J. L. Ketcham, of Indianapolis, presented a paper on the Indianapolis trade school known as the Winona Technical Institute. The paper appears on another page. Following the suggestion of the paper President Frank pledged $100 a year for five years from the United Engineering & Foundry Co., to be used in aiding boys who were learning the molder's trade.

The Cincinnati Milling Machine Co. invited the members of the association to visit its plant.

Election of Officers.

The report of the committee on nominations was presented by its chairman, H. W. Hoyt. The announcement of the name of Antonio C. Pessano, of Detroit, president of the Great Lakes Engineering Works, for the presidency was received with strong demonstration of approval, as was the nomination of C. Bermingham, of Kingston, Ont., for vice president. Messrs. Pfahler and McFadden escorted Mr. Pessano to the chair on his unanimous election and President Frank congratulated both the president-elect and the association. In response Mr. Pessano pledged his best efforts to the carrying out of the decision of the convention in its two days' session and predicted a strong accession of new members in the coming year if the present members would put forth the needed amount of individual effort.

Mr. Bermingham was compelled to respond to the applause which greeted the announcement of his election and referred to it as a recognition of the work of the Canadian membership.

The State Savings Bank, of Detroit, was re-elected treasurer.

F. W. Hutchings, who has been connected with the association headquarters for several years, was unanimously elected secretary in recognition of his services, succeeding A. E. McClintock, whom the administrative council promoted to the office of vice commissioner at its meeting just following the adjournment of the convention. Commissioner Briggs was unanimously chosen by the council to succeed himself.

The election of officers in the convention was completed by the choice of the following district committeemen:

First District.—Geo. H. Gibby, Gibby Foundry Co., Boston; F. B. Farnsworth, McLagon Foundry Co., New Haven, Conn.; F. D. Wanning, Birmingham Iron Foundry, Derby, Conn.; A. W. Whitcomb, Kabley Foundry Co., Worcester, Mass.; John Magee, Magee Furnace Co., Chelsea, Mass.

Second District.—James McNaughton, American Locomotive Co., Dunkirk, N. Y.; R. C. Oliphant, Trenton Malleable Iron Co., Trenton, N. J.; H. W. Wendt, Buffalo Forge Co., Buffalo; F. E. Wheeler, International Heater Co., Utica, N. Y.; Arthur E. Barlow, Newark, N. J.

Third District.—W. H. McFadden, Mackintosh-Hemphill Co., Pittsburg; Stanley G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia; Thos. E. Durban, Erie City Iron Works, Erie, Pa.; John E. Harbster, Reading Hardware Co., Reading, Pa.; Stuart R. Carr, Stuart R. Carr Co., Baltimore.

Fourth District.—W. D. Sayle, City Foundry Co., Cleveland; Wm. Gilbert, Buckeye Foundry Co., Cincinnati; H. J. Boggis, Taylor & Boggis Foundry Co., Cleveland; W. H. Morgan, Morgan Engineering Co., Alliance, O.; R. H. Jeffrey, Jeffrey Mfg. Co., Columbus, O.

Fifth District.—John L. Ketcham, Brown-Ketcham Iron Works, Indianapolis, Ind.; Ferd C. Schwedtmann, Magnetite Foundry Co., St. Louis; Robert Vierling, Vierling, McDowell & Co., Chicago; Ward W. Willits, Adams & Westlake Co, Chicago; H. K. Gilbert, Buda Foundry Co., Harvey, Ill.

Sixth District.—C. M. Power, St. Paul Foundry Co., St. Paul; T. J. Neacy, Filer & Stowell Co., Milwaukee; O. B. Kinnard, Kinnard-Harris Co., Minneapolis; H. M. Wallis, J. I. Case Plow Co., Racine, Wis.; Geo. H. Smith, Smith Steel Casting Co., Milwaukee.

Seventh District.—John M. Taylor, Taylor-Forbes Co., Guelph, Ont.; Geo. W. Watts, Canada Foundry Co., Ltd., Toronto, Ont.; R. J. Whyte, Frost & Wood Co., Ltd., Smiths Falls, Ont.; H. Cockshutt, Cockshutt Plow Co., Ltd., Brantford, Ont.; Chas. H. Carrier, Carrier, Lane & Co., Levis, Que.

Eight District.—W. D. Tynes, Hardie-Tynes Mfg. Co., Birmingham, Ala.; T. H. Benners, Birmingham Machine & Foundry Co., Birmingham, Ala.; T. J. Watson, Caldwell-Watson Foundry Co., Birmingham, Ala.; H. Blacklock, Blacklock Foundry, South Pittsburg, Tenn.; E. Burkitt, Southern Engine & Boiler Works, South Pittsburg, Tenn.

The convention adjourned sine die with a vote of thanks to the Cincinnati foundrymen for their excellent arrangements for the care of the visitors. A rousing vote of thanks was given the retiring officers and administrative council for the excellent manner in which they had conducted the affairs of the association in the past year.

Those in Attendance.

Isaac W. Frank, United Engineering & Foundry Co., Pittsburg.
Antonio C. Pessano, Great Lakes Engineering Works, Detroit.
H. A. Carpenter, A. Carpenter & Sons Foundry Co., Providence, R. I.
Geo. H. Gibby, Gibby Foundry Co., Boston.
O. W. Greenslade, Greenslade Foundry Co., Milwaukee.
J. D. Leary, Queen City Foundry Co., Cincinnati
H. K. McLean, Link-Belt Machinery Co., Chicago.
James McNaughton, American Locomotive Co., Dunkirk, N. Y.
C. M. Power, St. Paul Foundry Co., St. Paul, Minn.
W. H. McFadden, Mackintosh-Hemphill Co., Pittsburg.
O. P. Briggs, Commissioner, Detroit.
Wm. Gilbert, Buckeye Foundry Co., Cincinnati.
R. D. Reed, H. B. Smith Co., Westfield, Mass.
Frank Johannigmann, Johannigmann Foundry Co., Cincinnati.
Henry J. Gosiger, Eureka Foundry Co., Cincinnati.
J. A. Rathbone, United States Heater Co., Detroit.
H. W. Wendt, Buffalo Forge Co., Buffalo.
H. J. Boggis, Taylor & Boggis Foundry Co., Cleveland.
P. N. Ginther, J. Ginther's Sons, Buffalo.
Exile Burkitt, Southern Engine & Boiler Works, Jackson, Tenn.
D. P. Eagan, Henry E. Pridmore, Chicago.
Geo. J. Hessler, Syracuse Foundry Co., Syracuse, N. Y.
W. H. Pfahler, Abram Cox Stove Co., Philadelphia.
John L. Ketcham, Brown-Ketcham Iron Works, Indianapolis, Ind.
W. D. Sayle, City Foundry Co., Cleveland.
G. E. Emmons, Edison General Electric Co., Schenectady, N. Y.
C. Bermingham, Canadian Locomotive Co., Kingston, Ont.
W. M. Taylor, Chandler & Taylor Co., Indianapolis, Ind.
H. W. Hoyt, Chicago.
F. T. Towne, Yale & Towne Mfg. Co., Stamford, Conn.
Geo. Q. Thornton, Carondelet Foundry Co., St. Louis.
C. H. Joslyn, Merrimac Iron Foundry, Lawrence, Mass.
O. P. Letchworth, Pratt & Letchworth Co., Buffalo.
Chas. M. Jarvis, Russell & Erwin Mfg. Co., New Britain, Conn.
H. S. Hart, Russell & Erwin Mfg. Co., New Britain, Conn.
A. N. Abbe, P. & F. Corbin, New Britain, Conn.
Wm. H. Lyon, Chas. Parker Co., Meriden, Conn.
W. P. Haughton, Richmond City Mill Works, Richmond, Ind.
W. R. McClave, McClave-Brooks Co., Scranton, Pa.
L. P. Hubbell, Filimore Ave. Foundry & Iron Works, Buffalo, N. Y.
W. A. Sharp, McClave-Brooks Co., Scranton, Pa.
E. W. Stevens, Canton Roll & Machine Co., Canton, O.
R. C. Oliphant, Trenton Malleable Iron Co., Trenton, N. J.
F. A. Williams, Youngstown Foundry & Machine Co., Youngstown, O.
Thomas Parrock, Youngstown Foundry & Machine Co., Youngstown, O.
John M. McLaren, Phillips & McLaren, Pittsburg, Pa.
H. M. Wilson, Taylor, Wilson & Co., Allegheny, Pa.
E. G. Rippel, Buffalo Foundry Co., Buffalo, N. Y.
Frank Fiebeger, Akron Foundry Co., Akron, O.
Wm. G. Williams, Peerless Foundry Co., Indianapolis, Ind.
F. B. Cooley, Lancaster Malleable Iron Works, Lancaster, N. Y.
James Gilbert, Jackson & Church Co., Saginaw, Mich.
H. Blacklock, Blacklock Foundry, South Pittsburg, Tenn.
Will B. Greene, Palmers & DeMoy Foundry Co., Cleveland.
Wm. Greenbaum, Acme Foundry Co., Cleveland.
V. M. Moore, Chisholm & Moore Mfg. Co., Cleveland.
H. P. Ranney, American Shipbuilding Co., Cleveland.
Gardner Meeker, Meeker Foundry Co., Newark, N. J.
F. Macomb Cresson, Geo. V. Cresson Company, Philadelphia.
H. B. Atha, Benjamin Atha & Co., Newark, N. J.
John B. Jones, Utica Heater Co., Utica, N. Y.
H. M. Murphy, American School Furniture Co., Chicago.
Arthur J. Brawley, South Park Foundry & Machine Co., St. Paul, Minn.
F. B. Farnsworth, McLagon, Foundry Co., New Haven, Conn.
Henry E. Pridmore, Chicago.
H. K. Gilbert, Buda Foundry & Mfg. Co., Chicago.
W. J. Michel, Tarrant Foundry Co., Chicago.
C. J. Carew, Chicago Pneumatic Tool Co., Franklin, Pa.
G. A. Doeright, Falcon Bronze Co., Youngstown, O.
Frederick Noelke, Noelke-Richards Co., Indianapolis, Ind.
G. R. Brandon, Whiting Foundry Equipment Co., Chicago, Ill.
W. F. Deming, The Deming Co., Salem, O.
Edward Maher, Maher & Flockhart, Newark, N. J.
K. W. Grace, The Bucyrus Co., South Milwaukee, Wis.
C. B. Calder, Detroit Shipbuilding Co., Detroit.
Geo. McG. Morris, John B. Morris Foundry Co., Cincinnati.
Wm. C. Scott, C. W. Thomas, Detroit.
James McKnown, Josiah Anstice Co., Rochester, N. Y.
Wm. Gleason, The Gleason Works, Rochester, N. Y.
H. Lechtenberg, Central Iron Works, Quincy, Ill.
Wm. S. Simpson, Christopher & Simpson Architectural Iron & Foundry Co., St. Louis.
C. H. Cole, United Iron Works Co., Springfield, Mo.
T. L. Greenwald, I. & E. Greenwald Co., Cincinnati.
James Eastwood, Benjamin Eastwood Co., Paterson, N. J.
E. G. Crawford, Carondelet Foundry Co., St. Louis, Mo.
H. W. Bullard, Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y.
Geo. T. Brown, Brown Cotton Gin Co., New London, Conn.
E. W. Bradel, Pennsylvania Engineering Works, New Castle, Pa.
F. A. Strong, Eaton, Cole & Burnham Co., Bridgeport, Conn.
L. A. Woodard, Wm. Tod Co., Youngstown, O.
B. F. Lyon, Eaton, Cole & Burnham Co., Bridgeport, Conn.
T. J. Caldwell, Caldwell-Watson Foundry & Machine Co., Birmingham, Ala.
R. W. Boland, Birmingham Machine & Foundry Co., Birmingham, Ala.
B. T. Skinner, Advance Thresher Co., Battle Creek, Mich.
H. R. Robinson, Robinson & Co., Richmond, Ind.
Frank Land, Garr, Scott & Co., Richmond, Ind.
Ferd. C. Schwedtmann, Magnetite Foundry Co., St. Louis.
K. L. Green, Green's Car Wheel Mfg. Co., St. Louis.
P. Kennedy, Patrick Kennedy Foundry Co., Baltimore.
Wm. Medart, Medart Patent Pulley Co., St. Louis.
Geo. Kingsland, Kingsland Foundry, St. Louis.
F. B. Davant, J. W. Glover, Marietta, Ga.
Geo. F. Cottrill, Green's Car Wheel Mfg. Co., St. Louis.
B. F. Wade, Taylor & Boggis Foundry Co., Cleveland.
Jas. Fox, Benjamin Fox's Sons, Newark, N. J.
C. E. Greenwald, I. & E. Greenwald Co., Cincinnati.
Jos. A. Stone, Riverside Foundry Co., Cleveland.
Chas. C. Tyler, Allis-Chalmers Co., Chicago.
Ellis L. Rowe, Rensselaer Mfg. Co., Troy, N. Y.
Theo. Bollman, Bollman-Wilson Foundry Co., Cincinnati.
Geo. A. Farrall, Johnston Harvester Co., Batavia, N. Y.
Geo. M. Gillette, Minneapolis Steel & Machinery Co., Minneapolis, Minn.
T. L. Richmond, Buffalo Scale Co., Buffalo.
J. H. Webster, Variety Iron Works, Cleveland.
E. L. Munson, Munson Bros. Co., Utica, N. Y.
John K. Gunn, Utica Pipe Foundry Co., Utica, N. Y.
James F. Lanigan, Davis Foundry Co., Lawrence, Mass.
Chas. Lange, Buckeye Foundry Co., Cincinnati.
Frank E. Wheeler, International Heater Co., Utica, N. Y.
M. H. Barker, American Tool & Machine Co., Boston.
H. F. Arnold, American Tool & Machine Co., Boston.
Fred F. Stockwell, Barbour-Stockwell Co., Boston.
John R. Russel, Russel Wheel & Foundry Co., Detroit.
A. G. Olberding, Columbia Foundry Co., Cincinnati.
Geo. C. Forgeot, Allis-Chalmers Co., Chicago.
F. T. Giblin, Giblin & Co., Utica, N. Y.
Edgar McDougall, John McDougall Caledonian Iron Works, Montreal,

Quebec and Canadian Iron Foundry, Montreal.
John M. Taylor, Taylor-Forbes Co., Guelph, Ont.
Walter Wood, R. D. Wood & Co., Philadelphia.
Henry J. Weber, Newport Iron & Brass Foundry Co., Newport, Ky.
C. J. Mesta, Mesta Machine Co., Pittsburg, Pa.
C. C. Smith, Union Steel Casting Co., Pittsburg, Pa.
H. J. Nicholls, Canada Foundry Co., Toronto, Ont.
Geo. W. Watts, Canada Foundry Co., Toronto, Ont.
Stewart Johnston, Pittsburg Steel Foundry, Pittsburg.
Geo. H. Smith, Geo. H. Smith Steel Casting Co., Milwaukee, Wis.
Walter Laidlaw, Laidlaw-Dunn-Gordon Co., Cincinnati.
Louis J. McGrath, Thos. Delvin Mfg. Co., Philadelphia.
M. H. Bickley, Penn Steel Casting & Machine Co., Chester, Pa.
W. W. Balkwill, Cleveland Steel Casting Co., Cleveland.
James D. Hunter, James Hunter Machine Co., North Adams, Mass.
Wm. Butterworth, Deere & Mansur Co., Moline, Ill.
J. W. Gardner, Gardner Governor Co., Quincy, Ill.
J. W. Jeffrey, Jeffrey Mfg. Co., Columbus, O.
Robert Dey, Frazer & Jones, Syracuse, N. Y.
Fred Frazer, Frazer & Jones, Syracuse, N. Y.
W. B. Morrison, McIntosh & Seymour Co., Auburn, N. Y.
D. B. Kirk, C. & G. Cooper Co., Mt. Vernon, O.
M. E. Kennedy, Kennedy Valve Mfg. Co., New York.
A. G. Wilson, Bollman-Wilson Foundry Co., Cincinnati.

GUESTS.

John E. Gorsa, Buffalo Foundrymen's Association, Buffalo.
L. L. Anthes, Toronto Foundry Co., Toronto, Ont.
E. F. DuBrul, Cincinnati.
L. Kupferle, Kupferle Bros. Mfg. Co., St. Louis.
J. C. Kupferle, Johnson-Kupferle Co., St. Louis.
Geo. W. Cope, the *Iron Age*, New York.
D. H. McPherson, Philadelphia, Pa.
A. I. Findley, *The Iron Trade Review*, Cleveland.
W. P. Eagan, National Metal Trades Association, Cincinnati.
Robert Wuest, National Metal Trades Association, Cincinnati.
Oliver Phelps, Detroit, Mich.
Chas. F. Waltz, Cincinnati.
A. H. Bullard, Bullard Machine Tool Co., Bridgeport, Conn.
Hon. Geo. A. Littlefield, Providence, R. I.
A. C. Marshall, Dayton, O.
H. M. Lane, Lane & Bodley Co., Cincinnati.
Robert E. Masters, Cincinnati.
A. E. Pfahler, Philadelphia.
A. H. Pugh, Pres., Cincinnati Employers' Association, Cincinnati.
B. H. Langefels, St. Louis Axle Co., St. Louis.
E. C. Stearns, E. C. Stearns & Co., Syracuse, N. Y.
Wm. Dando, Steel Founders' Society, Pittsburg.
Stephan C. Mason, McConway & Torley, Pittsburg.
John A. Penton, Detroit.
John Hill, Hill & Griffith Co., Cincinnati.
Wm. Oberhelman, Hill & Griffith Co., Cincinnati.
H. L. Ide, A. L. Ide & Sons, Springfield, Ill.
A. E. Corbin, Connecticut Valley Metal Trades Ass'n, Springfield, Mass.
H. G. Fiever, Medart Patent Pulley Co., St. Louis.
L. Haney, Globe Foundry Co., Cincinnati.

NOTES.

No groups of attendants at the annual conventions of the National Founders' Association contribute more to the life of these meetings than the Canadian and New England contingents. A great gain was scored on the social side of the association's life when Canadian firms were admitted to membership, and the men who have been coming year after year from the other side of the border have proved a distinct force in the conventions. Similarly the New England delegation, party because that section has so flourishing an association for the discussion of foundry topics at monthly meetings, has always contributed to the spirit of *camaraderie* that is a feature of the N. F. A. meetings. It is evident that whatever may have been the distrust of others in the business, that marked the beginnings of the association's career, the men who go to its conventions year by year have learned to respect and to trust each other. This is one of the strongest factors in the life of the association. Friendships have been formed through these contacts, that will be lasting and that will be an element of strength in all the united undertakings of the membership.

Education is one of the watchwords of the N. F. A.—education of the molder, the proprietor not now affiliated, the foreman, and the boy who would learn the molder's trade but is denied the opportunity because of union restrictions. The movement started at Cincinnati for the encouragement of boys who would learn molding at a trade school, is destined to come to something substantial.

At the South Sharon, Pa., plant of the Carnegie Steel Co., gas from the by-product coke plant has been connected with one of the open-hearth furnaces for the purpose of utilizing it in the place of producer and natural gas. If the experiment proves successful all of the other furnaces will be connected as well as the heating furnaces and soaking pits. The by-product plant in addition to supplying its own boilers with gas has a surplus of about 3,000,000 cubic feet per day and this can be utilized to good advantage in the operation of the steel plant. During the first half of November the nine furnaces in operation produced 13,450 tons of steel, one furnace producing 1,850 tons in fourteen days while another produced 1,844 tons in thirteen days. The erection of a mixer at this plant is now contemplated as the iron from three blast furnaces is used in the open-hearth department.

The annual meeting of the sales representatives of the Jones & Laughlin Steel Co. was held at Pittsburg on Monday and Tuesday, Nov. 21 and 22. On Monday a thorough inspection of the company's South Side works was made and in the evening there was a box party at the Nixon Theater. The regular meeting was held on Tuesday and the affair closed with a smoker at the Pittsburg Club, Tuesday evening. The following representatives were in attendance: H. F. Holloway and C. S. Bradley, New York; D. N. Barker, Chicago; Geo. Kinsey, Cincinnati; F. M. Campbell, Philadelphia; W. M. Kelley, Atlanta; William Best, San Francisco; F. Holt, Detroit; W. M. Armstrong, St. Louis; Geo. C. Beals, Buffalo; W. F. Bonnell, Cleveland, and A. B. Marble, Boston.

The stockholders of the Pittsburg Stove & Range Co., Pittsburg, Pa., have approved the reorganization plan and have authorized the issue of $600,000 worth of bonds, $500,000 of which is to be used in retiring $1,000,000 of preferred stock on the basis of $2 of the preferred stock to $1 of bond. The remaining $100,000 will be used to cancel floating indebtedness. The company has at present no bonds, the stock issue consisting of $1,000,000 of preferred and the same amount of common.

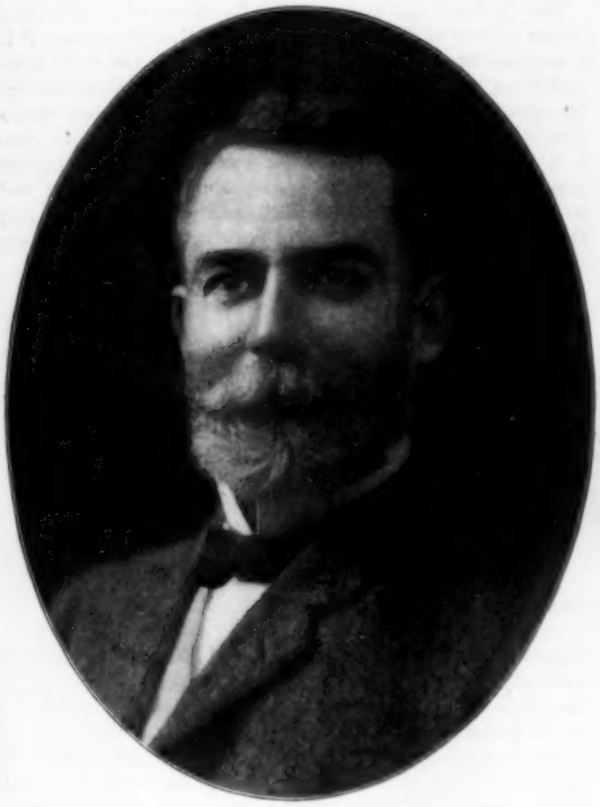
Members of the Engineers' Society of Western Pennsylvania visited the plant of Taylor, Wilson & Co., McKees Rocks, Pa., which is now under construction. It is the first reinforced concrete factory building in the United States and is 102 feet wide, 160 feet long, with a segmental roof of 54 feet span. The trip was made on Saturday, Nov. 19 and the railroad shops of the Pittsburg & Lake Erie Railroad were also inspected. A 30-ton crane is to be installed in the new plant of Taylor, Wilson & Co., with a 60-ton moving load.

The Carnegie Steel Co. is preparing to blow in blast furnace No. 3 at its South Sharon, Pa., plant. It was only recently completed and is the last of the blast furnaces designed for this plant. The stack is 85 x 19 feet and is equipped with four Cowper-Kennedy stoves, each 90 x 21 feet. The three furnaces have an annual capacity of 440,000 tons.

Eleven of the twelve open-hearth furnaces of the Carnegie Steel Co., South Sharon, Pa., are now in operation, two additional furnaces having been put on this week.

NEW OFFICERS OF THE N. F. A.

The newly elected president of the National Founders' Association, Antonio C. Pessano, of Detroit, president and general manager of the Great Lakes Engineering Works, has been for years one of the most prominent figures in the councils of the association. Probably no other member has participated in as many important conferences with the Iron Molders' Union, and his tact, patience and grasp of all the details of the various issues that have arisen between the two organizations made him a natural choice for chairman of the association's committee on uniform agreement which had in charge the important but fruitless negotiations with the union in the early months of this year. Mr. Pessano's career as a mechanical engineer and industrial manager has already been detailed in these columns. For a number of years previous to the organization of the Great Lakes Engineering Works in 1902 he was general manager of the Geo. V. Cresson Co., of Philadelphia.



ANTONIO C. PESSANO, PRESIDENT.

Cornelius Bermingham, who was elected vice president of the National Founders' Association at Cincinnati last week, is managing director of the Canadian Locomotive Works Co., of Kingston, Ont. He is about 50 years of age and was born in Galway, Ireland, but has lived in Canada since his childhood. He was educated in Kingston and Montreal and for a number of years was connected with the commercial activities of Kingston. In 1884 he removed to Pittsburg and spent 16 years there, most of the time as president of the Pittsburg Brass Works. In 1900 he was offered an interest in the locomotive works at Kingston and for the past four years has been the efficient managing director of the business. Mr. Bermingham is a man of genial personality, and of business acumen, and has fairly won his way to a leading place in the National Founders' Association.

TRAINING SCHOOL FOR FOUNDRY FOREMEN.*

BY GEO. Q. THORNTON.

It seems to be the consensus of opinion among foundrymen that one of the most pressing needs in the foundry business of today is a better class of foremen. When the majority of the foundries were of small size, employing but few men, and making little attempt at anything in the way of systematic records of work done and the cost of doing it; when specifications for the character of materials required were almost unknown, it was sufficient that the foreman should be a skilled mechanic in his line. He is that today, usually; but under existing conditions something more is required, if our foundries are to be operated in the accurate and scientific manner which characterizes, for instance, the better class of our machine shops. He must be a skilled mechanic, of course, but he must also have a knowledge of metallurgy which will enable him to produce castings of the required composition, and physical characteristics at the lowest cost for raw materials. He must have sufficient arithmetical and clerical ability to be able to calculate accurately the cost (for his own department, at least) of the castings made. He must be able to keep and to oversee the records of castings ordered and made, so that he may satisfy the consumer, while operating his foundry at as nearly a uniform rate of production as possible. Finally, in order that he may represent his employer fully and without mental reservation or prejudice in his dealings with the men in his charge, he should be wholly free from any sort of trades union affiliation, either directly, as by actual union membership, past or present, or indirectly, as by social ties or class prejudice.

CORNELIUS BERMINGHAM, VICE PRESIDENT.

In order to produce a class of foremen, distinguished by the characteristics above stated, I propose to establish a

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foundry which shall be a school for foremen, and in which young men may be trained under a systematic routine, for the discharge of all the functions of a foundry foreman or superintendent. The general plan of such an institution is outlined in the following suggestions, the details of which, however, will probably require modification upon further and more careful consideration.

The students would be graduates or former students of some technical school or college, and would be required to pass a proper examination before admission to the proposed school. They would be required to sign an agreement to remain four years, or such other term as might be decided upon, subject, however, to their satisfactory performance of the work given them to do, and would be paid a fixed rate per day during the term—say, $1.25 per day for the first year, $1.50 for the second year, $1.75 for the third year, and $2 for the fourth year.

The students would do all the work, mechanical, laboring and clerical, involved in the operation of the proposed foundry, under the control of a manager or managing committee, assisted by a few skilled workmen as instructors.

It is suggested that at the outset provisions be made for 20 molders, which would involve a total force of from 30 to 40 students. Such a shop would probably make five tons of good castings per day, or, say, 1,500 tons per annum.

It would not be advisable that the proposed foundry should go into the open market to secure orders for its product, as such a course would involve competition with such of our members as were situated in the vicinity. It is suggested, therefore, that our members be individually solicited to furnish orders for the product of said foundry, agreeing respectively to take a certain tonnage during the year. The cost of all such castings should be accurately kept by the foundry and reported in detail to the members for whom they were made. It might be well also that such castings should be paid for at cost, plus the actual fixed charges, which latter might include 6 percent interest on capital invested. If this were done accurately, no provision would be required for profits or losses which would be continuously and automatically absorbed. It is believed that in a short time the cost of such castings would be less than in the foundry of the member for whom they were made, which would insure him a small profit in the transaction, while at the same time the foundry school would be self-supporting. At the outset it might be found advisable to confine the product of the foundry to sash weights or similar coarse castings. A better class of work should, however, be substituted at the earliest possible date.

Should the proposed plan receive the approval and endorsement of the association and its administrative council, it is suggested that individual members of the association be solicited to subscribe the necessary capital and to guarantee the required product.

As fast as the student should become fit for actual service applications should be received from members of the association in need of such help, preference being given in this regard to the subscribers to the capital and users of the product of the institution.

The plan outlined above need not interfere with suggested schemes for the education and training of apprentices for the foundry. Such a scheme, in fact, might at a future date be made a valuable addition to the institution now under consideration. But it is submitted that perhaps the most difficult and delicate feature of any such proposal is the question of securing sufficient tonnage of product for such a shop without unduly interfering with the operations of the foundries of our own members.

From this standpoint, it might be better to begin at least with a smaller number of young men who should acquire the ability to educate the apprentices required in the foundries which might eventually secure their services.

THE COCKERILL GAS ENGINE.

The Cockerill gas engine has been discussed in *The Iron Trade Review* of Oct. 22, 1903, and on other occasions. It is a machine of accepted prestige as shown by the notable installations, and the American builder, the Wellman-Seaver-Morgan Co., of Cleveland, has a list of 121 gas engines with a total of nearly 80,000 b. h. p. in units of from 200 to 3,000 b. h. p. The machine is especially adapted for blast furnace blowing engine service and heavy duty electric light and power transmission. The engine is built with one, two or four cylinders on the well known four-cycle type in which only one

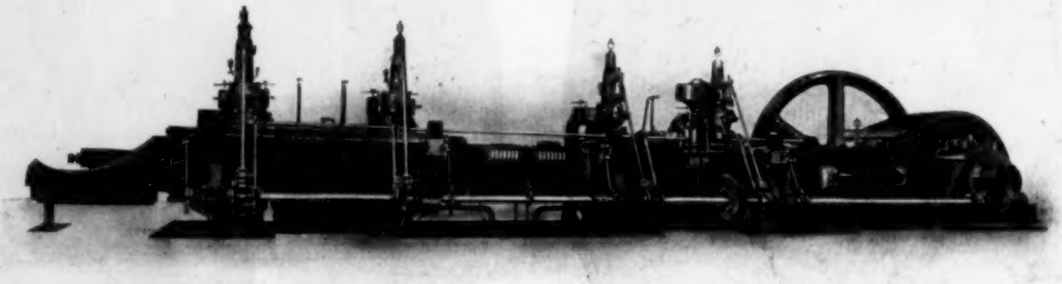

FIG. 1.—500-H. P. TANDEM DOUBLE ACTING COCKERILL GAS ENGINE.

impulse caused by the combustion of the gaseous mixture takes place during one stroke of the complete cycle or in two revolutions. This action occurs on each side of the piston as the cylinders are built double acting.

The regulation is effected by a governor which controls the admission of the mixture of gas and air in either of the following ways: By automatically cutting off or by throttling a constant mixture, either of which produces variable compression; by varying the relative volumes of air and of mixture, the latter always following the former, this method resulting in constant compression. By this latter method the mixing valve remains lifted up during the entire suction stroke. The gas valve opens at a certain point during the suction stroke, and remains open until nearly the end of same. The point of opening is variable, and is determined by the governor at all times. The quantity of gas admitted is in exact proportion to the load of the engine and the compression remains constant.

Owing to the considerable differences in temperature occurring in the cylinder, it is necessary to provide for free expansion, and this is obtained by supporting the cylinder in a cradle, one end only being attached to the main girders of the engine bed. The power of each end of the cylinder is transmitted directly through the girders to the engine frame, as the two heads of each cylinder are connected by through-going bolts, and the power developed in the back end of the cylin-

der is transmitted through these to the front end. The cylinder proper is therefore not subjected to the stresses incidental to power transmission. Provisions are made for free expansion of the cylinder liners; cylinder heads can be easily removed in order to inspect the pistons without dismantling any part of the valve gear. The engines are provided with magneto-electric igniters of the most improved system. The starting of the engine is effected by compressed air.

The pistons are steel castings in one piece and secured to the piston rod by means of a collar and nut. No taper is used on the rod, and the wedge action caused by tightening the nut and tending to split the piston, is avoided. A special feature of the engine is the water-cooled piston rod nut, an additional preventive of premature ignition. The pistons do not bear in the cylinders, but are supported outside the cylinders by cross heads.

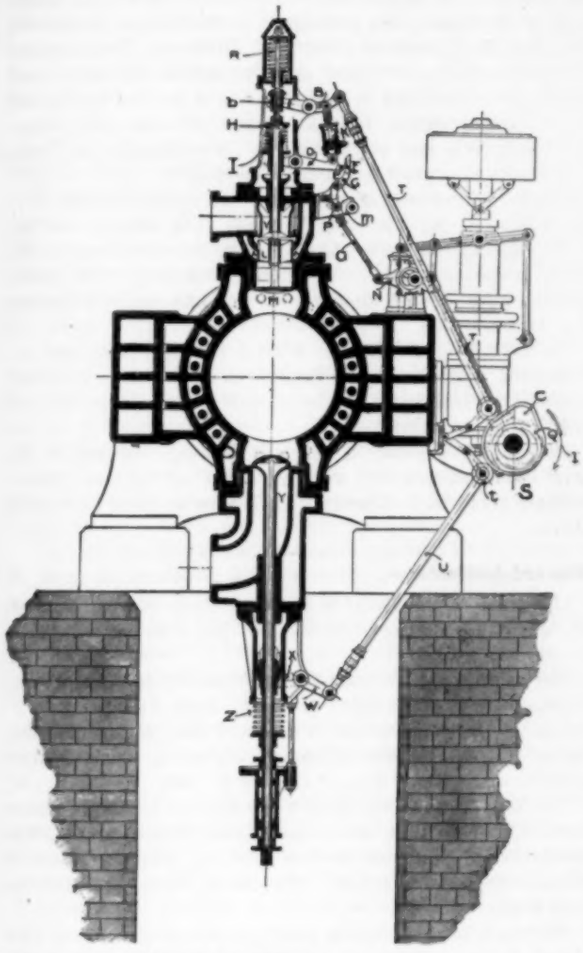

FIG. 2.—CROSS SECTION THROUGH CYLINDER AND VALVES OF COCKERILL GAS ENGINE.

All valves of each cylinder end are operated by a single cam; therefore in a four-cylinder double-acting gas engine there are only eight cams in all. The valve gear, though performing the regulation of the mixture in a perfect manner, is of great simplicity and consists of a very few parts in motion. The side shaft S, driven by the engine shaft, and making one revolution to two of the latter, because of the four-cycle principle, carries a cam C for each cylinder end. This cam serves for operating both inlet and outlet valves. The cam revolves in the direction indicated by the arrow l. When the lobe of the cam begins to act on the roller the latter and the rod T rise, the lever B oscillates, and its end b descends. This movement causes both the mixing valve M and air valve L to open. The latter, which is fixed to the mixing valve M, uncovers the air ports A. The instant of opening these valves corresponds exactly to the dead center position of the piston at the beginning of the suction stroke. In the first part of the suction stroke, air only is drawn in. The double beat gas valve V, concentric with the mixing valve, remains closed. It is operated by the lever D, whose outer end E engages with the latch F of the lever G, when the inlet valves are on their seats. During the opening of the mixing valve, the spring cap H, fastened to the mixing valve stem, compresses the spring as the spring cap I on the other end is fastened to the hollow stem of the gas valve, which, being blocked by the latch, remains closed. The connection K, and its parts, act as a link of variable length between the levers B and D. An eccentric Q on the side shaft S operates a small cam m by means of the rod T^1, the oscillating lever N and the rod O. The center of oscillation of the lever N is variable and under the control of the governor, and the effect of the displacement of this center is similar to a change of the length of the rod O. The cam m operating on the roller P, secured to the end of the lever G, disengages the latch F, at a definite moment predetermined by the governor, and the gas valve V opens quickly, the amount of opening being limited by the space between the piston and the bottom of the dash pot cylinder K. The proportions of the lever B and D are such that the opening of the valves V and M and also the slide L bear a fixed relation with one another. From the moment of the opening of the gas valve, which corresponds to a certain predetermined position of the piston during the suction stroke, air and gas in proper proportions are admitted so as to give a good mixture. Whatever the moment of cutoff may be, the proper quantity of gas and air for a good mixture is admitted. The two valves and the slide remain open until the end of the suction stroke. At this moment while the roller r descends on the lobe of cam C, the large spring R closes the mixing valve and the air slide, and the link K returning to its original length transmits the descending motion of B to D, and closes the gas valve V. A small spring is introduced so as to permit the mixing valve M to continue its motion and seat itself should the valve V touch its seat before M can close. The piston on its return stroke compresses the charge, the inlet and outlet ports of the cylinder being closed; but as the variable quantity of mixture followed a certain volume of air and completed the 100 percent of cylinder volume, the richest mixture remains close to the igniters located in each cylinder head, and therefore firing is assured even with smallest load.

A little before the dead center position corresponding to the end of the expansion stroke, the lobe of the cam C touches the roller t and acts by means of the rod U and the levers W and X upon the exhaust valve Y, opening the same. This valve remains open during the exhaust stroke (on the second return stroke of the piston), and is closed on the dead center corresponding with the beginning of the next suction stroke by means of the spring Z, which acts at all times to close the valve and presses the roller t against the cam C.

The builder, the Wellman-Seaver-Morgan Co., of Cleveland, guarantees a heat consumption of 10,000 B. t. u. per b. h. p. per hour, and a thermal efficiency of 25 percent at the rated capacity of the engine.

Application has been made to the New York Stock Exchange by the Colorado Fuel & Iron Co. to list $6,200,000 additional capital stock. This is the new common stock authorized by the bondholders protective committee in its financial plan. The plan provided for $45,000,000 bonds and $6,200,000 stock

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The bulletin of the Worcester, Mass., Labor Bureau takes a positive stand against letting foreigners in to visit American plants. It expresses the opinion that not only the tariff should protect our industries, but that the doors of all shops should be closed to foreigners.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Safety Nut Lock Co., Faribault, Minn., recently incorporated under the laws of Minnesota with a capital of $100,000, is about ready to start business and will be glad to get in touch with concerns manufacturing machinery for its class of work. Quarters have been secured under a long lease and some machinery has been ordered. One set of machinery will consist of milling devices which will slot both the bolts and nuts and a machine is now under construction which will mill nuts separately at the rate of 36,000 per day. The safety nut lock is a simple and effective device thoroughly tested. It can be applied to any nut of any style or quality, and removed without injury to either. The nuts are milled near the corner into which a wire is swaged and the wire in turn filling cross slots which have been milled into the end of the bolt. Users of farm machinery and threshers and mechanics state that it results in a material reduction in the expense usually put out for repairs. Railroads which have been supplied with samples have made the company some very satisfactory reports concerning the value of this device, which has been patented in Canada, England, Germany, France and Belgium.

The Osawatomie Iron Works, Osawatomie, Kan., has been incorporated with a capital of $6,300.

The Walter F. Safford Machine Co., Portland, Me., has been organized with a capital of $50,000 to manufacture and deal in machinery of all kinds. Officers are: President, Walter F. Safford, of Portland; treasurer, Charles F. Safford, of Portland.

The Comstock Engine Co., Brooklyn, N. Y., has been incorporated with a capital of $10,000. Directors are: Chester Comstock, Charles Leffler and J. J. Trappan, of Brooklyn.

The Ross Machine Co., Buffalo, N. Y., has been incorporated with a capital of $10,000. Directors are: James B. Ross, Charles H. Walters and W. M. Hoffer.

The Brantley Mfg. Co., Birmingham, Ala., has been incorporated with a capital of $100,000, of which $50,000 is paid in. The company will do a general foundry and machinery business and engage in the manufacture of cotton gins, cotton mill machinery and cottonseed oil mill machinery. Incorporators are: J. S. Boggs, Albany, Ga.; Ben T. Wade, Troy, N. C.; and H. Linden Zell, Birmingham.

The Bloomington Iron & Brass Foundry, Bloomington, Ill., has been incorporated with a capital of $10,000, to do a general foundry business. Incorporators are: W. E. Allen, J. F. Narwood and H. I. Strech.

The Brayton-Woodworth Co., Cleveland, O., has been incorporated with a capital of $25,000. Incorporators are: John H. Woodworth, Levi A. Johnson, Harry C. Engert and Conway W. Noble.

The Kentucky Foundry & Machine Co., Eddyville, Ky., has been incorporated with a capital of $15,000. Incorporators are: J. B. Girdler, A. N. Webb and J. W. McMullen.

The Canada Machinery Co., Point Edward, Canada, has been incorporated with a capital of $100,000. Directors are: David Milne, Thomas Kenny, Charles S. Ellis, J. H. Kittermaster, C. Mackenzie and T. H. Cook.

Both the Russian and Japanese Governments are in the market for equipment for machine shops. The sales are not usually made directly to these Governments, but little effort is made to maintain secrecy, as there does not appear to be much fear that the cargoes will be seized as contraband of war. Eastern manufacturers are getting a large share of the Japanese orders, but some of the foreign business is coming to the West, Bardons & Oliver, of Cleveland, being among those who have recently obtained orders of fair size. The machines shipped from Cleveland were turret lathes and were ordered by the Moscow representative of the company. One large tool builder in New York was recently compelled to refuse an order from the Japanese Government for 39 lathes because his works were already employed up to their maximum day capacity and the foreign purchaser was not willing to pay the required advance of 15 percent for the necessary night work.

An important inquiry recently sent out was for $20,000 worth of machine tools, by the Otis Elevator Co. The new machinery which it intends to buy will be installed in its plant at Yonkers, N. Y.

The Lehigh Valley railroad is understood to be buying considerable equipment for its new shops at Sayre, Pa.

D. T. Williams, for 15 years with the Lunkenheimer Co., has organized the D. T. Williams Valve Co., Cincinnati, which has been incorporated with $50,000 capital, all subscribed. The officers and incorporators are: D. T. Williams, president; F. X. Pund, vice president; J. W. Tarbell, treasurer; F. L. Swanberg, secretary; and W. J. Munster. The company has taken a five years' lease on a building at Broadway and Eggleston avenue, and is now adapting it for the purpose of manufacturing valves, lubricators and oil and grease cups. Mr. Williams is now placing orders for equipment and hopes to have the new plant in operation by Jan. 1.

Articles of incorporation of the Marshalltown Safe Co., Marshalltown, Ia., will soon be filed. The officers will be: O. L. Ingledue, president; L. C. Abbott, vice president; A. W. Heald, treasurer, and F. G. Pierce, secretary. The incorporators have secured an option on the sale and manufacture of a farmer's safe.

The Nye Tool & Machine Works, Chicago, have been incorporated with a capital of $25,000, to manufacture tools and machinery. Incorporators are: Harry Nye, Henry Jansen and F. J. Kinzelmann.

The Sumter Foundry & Machine Works, Columbia, S. C., have been incorporated with a capital of $12,000. Incorporators are: R. I. Manning, C. G. Rowland and George D. Shere.

Fires and Accidents:—

The plant of the Decatur Malleable Iron Works, Decatur, Ill., was totally destroyed by fire Nov. 14. The loss is between $20,000 and $30,000.

The plant of the Emmons-Borden Foundry & Machine shop, Trenton, N. J., was burned Nov. 13. Loss, $10,000.

Fire at the plant of the Friction Pulley & Machine Co., Sandy Hill, N. Y., Nov. 11, practically ruined the company's patterns and pattern room. Loss is $15,000.

The foundries of the Day-Ward Co., Warren, O., manufacturer of bath tubs, lavatories, enameled sinks and kindred articles, were destroyed by fire Nov. 17, entailing a loss of between $25,000 and $30,000. The rebuilding of the plant has been begun.

The plant of the Pearson Boat & Construction Co., at Park Point, Superior, Wis., was damaged by fire Nov. 12, to the extent of $100,000. Insurance, $74,000.

The machine shops at the Reinecke mines, Madisonville Ky., were burned Nov. 14. Loss, $6,000.

The plant of the James Smart Mfg. Co., Brockville, Ont., manufacturer of wringers and tools, was damaged by fire Nov. 16. Loss, $15,000, fully insured.

New Construction:—

The Sieg Iron Co., Davenport, Ia., has a building in course of erection which will cost about $28,000, and will contain floor space to the amount of about 40,000 sq. ft. This building will carry a well assorted stock of bar iron and steel, together with a full line of heavy hardware and wagon and carriage material.

The United States Cast Iron, Pipe & Foundry Co. contemplates making extensive improvements to its plant at Besse-

mer, Ala., but is not prepared at present to give details of its plans. It is the policy of this company to keep its plants in the very best condition possible.

The Galesburg Coulter-Disc Co., Galesburg, Ill., recently incorporated, has elected the following directors: C. M. Avery, S. A. Ingersoll, A. C. Gaylord, L. F. Wertman and E. P. Robson; and at a subsequent meeting of the board the following officers were elected: S. A. Ingersoll, president; C. M. Avery, vice president and general manager; H. A. Nelson, secretary; L. F. Wertman, treasurer; A. C. Gaylord, superintendent. This company suceeds the Sandoval Mfg. Co., of Sandoval, Ill., of which Mr. Ingersoll has been manager since its inception; also the Geo. W. Brown & Co., of Galesburg, Ill., and will continue the manufacture of rolling coulters, discs and repairs for the Geo. W. Brown & Co. line of implements. The company is building a new plant on the outskirts of Galesburg, which will be modern in every way and will be of the following dimensions: 144 x 224 ft. with a hollow square 48 x 96 ft. The office building, 48 x 48 ft., will be two stories, the remainder, one story. The blacksmith and grinding departments will have a ventilated roof, giving ample light and ventilation. It will be equipped with two 100-h. p. high pressure boilers and 175-h. p. Corliss engine. The building is well under way, the boilers and engine have been ordered, and the company expects to have the building enclosed by Jan. 1, at which time the Sanoval Mfg. Co. will remove to Galesburg, when the new company will begin taking over the material and stock of the Geo. W. Brown & Co. now on hand at the old plant. For the present the office will be located at 135 South Prairie street.

The Ansonia Copper & Sheet Iron Works, Cincinnati, O., whose old plant was recently damaged by fire, have been building a new plant for the past three months and expect to occupy it within six weeks. The company is using a part of the damaged building as temporary quarters.

The Clinton Iron Works, Clinton, Tenn., have completed the brick foundation for their new foundry building which they expect to have ready for occupancy by Dec. 1.

The Illinois Central railroad has completed its additions to its shops at Memphis, which cost $250,000, and now is operating the largest shops south of the Ohio river.

The York Safe & Lock Co., York, Pa., has begun excavating for the erection of an addition to its plant.

The subscriptions necessary to secure the Carroll Yielding Barb Wire Co.'s plant have been made at Peoria, Ill. Plans and specifications for the plant have been placed in the hands of contractors. Contracts for barb wire machines have been let.

Improvements and repairs are fast being completed at the plant of the Perkins Machine Co., Warren, Mass. The foundry will be connected with the machine shop, and the 20-ton electric crane will be operated in both departments. The company has a number of orders on hand from the French and German governments which will insure the operation of the plant throughout the winter.

C. A. Peckham, Thomas H. Tracy, Robert H. Finch and other citizens of Toledo, O., are considering the formation of a company and building of a plant for the manufacture of bridges.

Under an order made by the superior court at Tacoma, Wash., the coal and coke properties of the Montezuma Mining Co. and the Washington Co-operative Mining Syndicate, near Fairfax, Wash., have been deeded to the Western Iron, Coal & Coke Co., which has started the operation of the mines and will establish a plant in or near Tacoma for the manufacture of iron and steel. The company, whose office will be in Tacoma, has been incorporated with a capital stock of $1,000,000. Its trustees are: James W. Ladd, Timothy O'Connor, S. J. Smyth, W. R. Andrus and William H. Flett.

The foundation has been laid for the addition to the Stephens-Adamson machine shop, Aurora, Ill. The building will be 80 x 120 ft., one story, and will cost $10,000.

The Alston Stone Machine Co., manufacturer of stone-working machinery, will build a plant at Endicott, N. Y., a suburb of Binghamton, N. Y.

The Carbondale Machine Co., Carbondale, Pa., will erect shops at Simpson, Pa., as the business of the company has outgrown its Carbondale plant.

The Norfolk & Western railroad is receiving bids for a new machine shop, to be erected at Roanoke, W. Va.

The Indiana Bridge Co., Muncie, Ind., will move its plant to another location in that city, where it will have greatly improved facilities for conducting its business. Considerable new machinery will be installed.

The Crane Co., Chicago, will erect a $100,000 office building at the northwest corner of Canal street and Twelfth place. The structure will be 93 x 100 ft., four stories. It is the intention of the company to move all its offices in Chicago to the new building.

Ground has been broken north of the village of Lexington, Richland county, O., for the plant of a gas producing machine manufactory. The machine is the invention of Dr. Harry Smith, of Lexington. A company with paid up stock of $33,000 has been organized and a plot of seven acres was purchased, on which will be erected a building 50 x 100 ft.

The Inter-State Steel Co., Rockford, Ill., is building an additional furnace to its plant. It now has one furnace in operation and with the addition will have a capacity of 1,500 tons of soft center steel per year.

The J. George Leyner Engineering Works Co. expects to have its plant now being built at Littleton, Col., near Denver, completed by Jan. 1. Four buildings are now under roof. The buildings include a forging house, machine shop, pattern shop, power house and office. The cost of the entire plant, including land, will be about $300,000. To this will be added the equipment from the present plant of the company in Denver, making a total valuation of about $650,000. About 200 men will be employed. The company makes drills, compressors, hoisting engines, mine cages and other mining machinery.

Peter McConochie, proprietor of the Union Foundry, Machine & Boiler Works, at Lower Slatington, Pa., has torn down his old plant and is building a new one, so that he may enlarge his business.

H. E. Thompson, of Louisville, Ky., is constructing a galvanized iron works plant 85 x 170, and a foundry 180 x 85 ft.

A foundry and machine shop is to be established at Knoxville, Tenn., by Springer & Lister. They have secured a site for their buildings.

The Scottdale furnace, Scottdale, Pa., operated by Corrigan, McKinney & Co., of Cleveland, has been blown out and the stack will be increased in height from 67 to 80 ft. Hand filling will be continued.

General Industrial Notes:—

Thirty-five thousand tons of steel rails will be needed by the Mexican Central railroad for 1905 delivery, and it is reported that the order is likely to go to the Tennessee Coal, Iron & Rail Road Co. This is in spite of the import tax of nearly $10 a ton which was put into effect this year to help the new steel plants of Mexico.

The Pittsburg Steam Specialty & Engineering Co., 311 Empire building, Pittsburg, recently incorporated, expects for the present to act as manufacturers' agent. The company controls the patent right of several specialties, which are at present in the experimental stage. As soon as these are perfected the company will procure a suitable manufacturing establishment and market its specialties. For the present it solicits opportunities to bid on complete power plant equipment or a portion thereof, and also invites inquiries from manufacturers seeking agencies in the Pittsburg territory.

Efforts are being made to secure the removal of the Arctic

Machine Co., of Canton, O., to Akron, O. Negotiations have been opened by the receiver with the owners of the Empire Reaper & Mower Co., and if the Arctic Machine Co. should be taken over by the Akron company the output will be manufactured at the company's plant in South Akron.

The plant of the American Malleable Iron Co., Chicago Heights, Ill., has been placed under contract to H. W. Petty and C. W. Quarrier for the proposed Western Steel Castings Co., the organization of which is not yet completed. The consideration is $130,000, and the new company will expend about $40,000 in the construction of an open-hearth furnace and installation of machinery.

The firm of J. & W. Jolly, Holyoke, Mass., has secured a new location for its repair department, which will have about 14,000 sq. ft. of floor room. The firm has its main plant on South East street, where its turbine wheels are made; its repair shop only is to be moved to the new location on Bigelow street.

The Niles Tool Works Co., of Hamilton, O., has just received an order for 40 lathes from the Japanese government. The lathes are to be used in Japanese shipyards and are especially adapted to the repair of warships.

The announcement that the Avery Stamping Co., Cleveland, O., had acquired the property of the West Virginia Steel Co., Wheeling, W. Va., and removed the plant to Bellaire, O., where the plant would be operated under the name of the Avery Stamping Co. was not correct, as the Avery Stamping Co., of Cleveland, is not in any way connected with the Avery-Caldwell Mfg. Co.

The Cincinnati Planer Co., Cincinnati, O., manufacturer of planers, which recently increased its capital stock from $30,000 to $200,000, has made some changes in the officers. W. H. Burtner has disposed of his interest in this company on account of poor health and the present officers are: C. H. M. Atkins, president; B. B. Quillen, secretary and treasurer; George Langen, superintendent. It is the company's plan to make some improvements in its plant at an early date, but just what they will be has not been definitely decided.

The plant of the Indiana Truck Scale Co., Bluffton, Ind., has been sold to S. Snell and other Toledo capitalists, who will retain the old name and continue the manufacture of truck scales.

A mechanics' lien for $15,000 was filed last week against the Central Car & Foundry Co., Vincennes, Ind., by W. W. Staley, who has the contract to erect the buildings. The Vincennes Board of Trade is made a party to the suit, and will try to solve the trouble.

G. N. Seidel & Co., boiler manufacturers, Christiana, Pa., will move their plant to Weatherly, Pa. The firm employs 130 men.

The Crane Co., of Chicago, manufacturer of valves and steam fittings, has bought out the Young-Heintz Co., Dallas, Texas, and will open a branch in that city.

The Virginia Iron, Coal & Coke Co. put one of its two Middlesboro, Ky., furnaces in blast Nov. 21. The company's Radford furnace will go into blast Dec. 1, and the Bristol furnace will follow on Jan. 1. Other furnaces of the company will be put in operation as rapidly as they can be prepared.

The Winnipeg General Power Co. has awarded to the Canada Foundry Co., Toronto, the contract for 750 steel towers, which will support the power lines from a power station 80 miles outside of Winnipeg to the Winnipeg Street Railway & Lighting Co.

A. M. McCarty, referee in bankruptcy at Canton, O., has made a decision in the claim of the Bourne-Fuller Co., of Cleveland, against the Structural Steel Car Co., of Canton. The claim was $50,000 for 4,000 tons of material which was never delivered. The referee allowed $7,200, which represents the profit which would have resulted by filling the order.

The Parsons Foundry & Machine Shops, Parsons, Kan., have been sold by Otto Haubold to Millard F. Smith, who will remove the machinery from his old plant to that of the plant recently purchased.

The Carolina Steel Bridge & Construction Co., Burlington, N. J., which installed an up-to-date plant of about 12,000 tons capacity 18 months ago, has been purchased by the Virginia Bridge & Iron Co., Roanoke, Va. This acquisition will enable the company to produce 20,000 tons of material per year.

The Singer Sewing Machine Co., Elizabeth, N. J., has been incorporated with a capital of $1,000,000 to sell the sewing machines manufactured by the Singer Mfg. Co.

Delay in completing the repairs at furnaces E and B at the Minnequa plant of the Colorado Fuel & Iron Co. made it necessary to suspend operations in the Bessemer steel department for a few days. The converter was put out of blast to give the furnaces a chance to catch up on the supply of iron. It is the opinion of the management that this will probably be the last time that the cry of "no iron" will come from the steel department, as it is supposed that by the time the converter again approaches the danger line, at least one more furnace will be in operation and enough iron will be forthcoming to keep the converter in operation.

The Bridgeport Malleable Iron Co., Bridgeport, Conn., which recently filed a certificate with the Secretary of State of Connecticut, providing for an increase of capital to $4,000,000, took the step to enable the working out of ideas along progressive lines. The company is not ready to announce details of its plans. The officers of the company are: William A. Grippin, president; Harris Whittemore, vice president; William J. Grippin, treasurer; Henry Atwater, secretary.

The Sharon Steel Hoop Co., Sharon, Pa., is arranging to build a 10-in. hoop mill which will probably be of the Morgan continuous type, with continuous heating furnace.

The Wheeling & Lake Erie railroad has placed a contract for 1,000 tons of bridge material with the King Bridge Co., of Cleveland. The Michigan Central railroad has also ordered 1,400 tons of bridge material.

The American Locomotive Co. has made public several orders of considerable size that have been received recently. The Cincinnati, Hamilton & Dayton-Pere Marquette system has ordered 40 locomotives; the Delaware, Lackawanna & Western, 32; the Boston & Maine, 28; the Chicago & Eastern Illinois, 12; and the Kinshui railway, of Japan, 12; the Chesapeake & Ohio, 12. Among recent orders for cars are the following: The Hocking Valley, 100 flat cars, from the Pressed Steel Car Co.; the Southern Indiana, six passenger coaches from Barney & Smith; the United Coal Co., 500 freight cars from the Standard Steel Car Co.; the St. Louis & San Francisco, 800 box, 400 furniture and 1,000 coal cars from the American Car & Foundry Co.; and the Lehigh Valley, 1,000 steel underframe box cars from the American Car & Foundry Co.

Furnace No. 4 of the Tennessee Coal, Iron & Railroad Co. went into blast Nov. 17, after being idle three months, with the exception of two weeks.

The Yetman Typewriter & Transmitter Co. has leased from the Remington Arms Co. part of the Tower building, Ilion, N. Y., for the manufacture of typewriters. The machinery which is now located at the Monarch Typewriter Co. plant at Syracuse will be moved to Ilion. Mr. Yetman expects to begin operations about Dec. 1.

The Phenix Iron Works, Winona, Minn., recently incorporated, was organized to carry on the business formerly conducted by the late W. M. Hurlbert. The incorporators are all young men of experience in mechanical work. The company will make a specialty of machine molded iron pulleys and general machine work. The directors are George A. Polley, Frank J. Brom, Albert A. Brandt and Charles Bergler. The following officers have been elected: Albert A. Brandt, president; George A. Polley, secretary and treasurer; Frank J. Brom, manager of foundry; Charles Bergler, manager of machine shop.

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Our extended experience in connection with thousands of installations of our Cochrane Heaters in Central Station work, Steel and Iron Furnaces and Mills, Textile Establishments, Office Buildings, Manufacturing plants, etc., enables us to make valuable recommendations as to the best method of installing and operating our Cochrane Feed Water Heaters.

For instance. A manufacturing concern in Philadelphia found that their supply of steam was insufficient for their requirements, and that they had not enough boiler capacity for increasing the supply. Very often they had to run the washing and finishing departments all night to keep up with the dyehouse.

We learned of their situation and recommended the installation of one of our Cochrane Feed-Water Heaters and Receivers, taking into consideration the engineering features involved, and as a result they now save 25 percent of their former coal bill, are able to get through washing and finishing by 3 o'clock in the afternoon, and have ample boiler capacity for their present requirements.

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HARRISON SAFETY BOILER WORKS,
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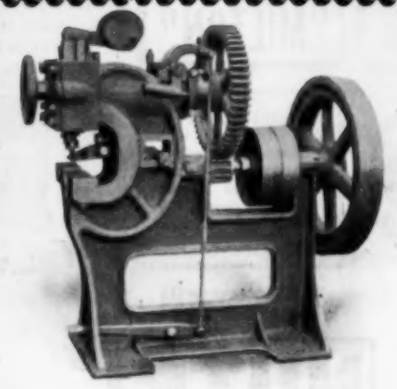
Manufacturers of Cochrane Feed Water Heaters, Cochrane Steam and Oil Separators and the Sorge-Cochrane Systems.



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Capacity, ½" hole through ½" plate

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In stock for immediate delivery

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The Cleveland Punch & Shear Wks Co.
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"Our Name Denotes Quality"

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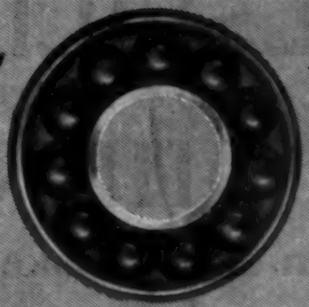

The test of quality lies in service. The best balls are known as "High Duty." We make them.

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General Offices at LEBANON, PA., U. S. A.

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Merchant Bar Iron and Steel

(ANNUAL CAPACITY ABOUT 150,000 TONS)

ALSO EVERY VARIETY OF

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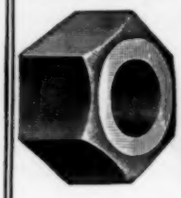

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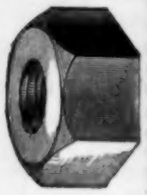

The price will interest you

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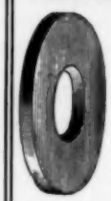

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